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DETERMINANTS OF LEASING DECISION; INTERNATIONAL EVIDENCE

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Yritysten leasingkäyttöpäätöksiin vaikuttavat tekijät; Kansainvälinen aineisto

Tavoitteet

Tutkimuksen tavoitteena oli tarkastella leasingin käyttöä yritysten rahoitusmuotona. Tarkoitukseni oli löytää aiemmasta kirjallisuudesta ja tutkimuksista tekijöitä, joiden on oletettu vaikuttavan leasingin käyttöpäätöksiin. Teoriaan perustuen valitsin keskeisimmät tekijät, joista rakensin kahdeksan hypoteesia tarkemman empiirisen tutkimuksen ja testauksen kohteeksi. Tutkimukseni käsittelee yrityksen talouteen ja rahoitukseen liittyviä tekijöitä sekä vuokrattavan kohteen erityispiirteiden vaikutuksia päätöksentekoon. Suoritin analyysin erikseen käyttö- ja rahoitusleasingille.

Tutkimus on suoritettu kansainvälisellä aineistolla ja tarkastelen myös maakohtaisten tekijöiden vaikutusta. Tutkimuksen asettelu mahdollistaa myös toimialakohtaisen ja yrityskoon vaikutusten tarkastelun.

Tutkimusmenetelmät

Tutkimusaineisto on poimittu 25 maan yrityskohtaisista tiedoista, jotka on kerätty vuosilta 1999-2003. Tutkimusyksikkönä on "yritys-vuosi". Pyrin kokoamaan aineiston niin, että kunkin maan koko saatavilla oleva tietokanta on huomioitu. Datalle asetetut vaatimukset rajoittavat aineiston määräksi 66 292 havaintoa. Aineisto on analysoitu käyttäen Tobit ja logit regressiota.

Tulokset

Tutkimuksen keskeisimmät tulokset liittyvät leasinginpäätöksiin vaikuttaviin tekijöihin. Käyttöleasingin hypoteeseista kaksi tuki alkuperäistä hypoteesia, yksi osoittautui päinvastaiseksi ja kaksi jäi avoimeksi ristiriitaisten tulosten vuoksi. Tulokset tukevat olettamusta, että yrityksen marginaalisen veroprosentin pienentyessä käyttöleasingin osuus taserakenteessa kasvaa. Myös yritysten kasvuodotusten parantuessa käyttöleasingin hyödyntäminen näyttäisi kasvavan. Vastoin odotuksia yrityksen koon vaikutus käyttöleasingiin osoittautui positiiviseksi: yrityksen kasvaessa myös leasinginstrumentin käyttö lisääntyi.

Myös rahoitusleasingin hypoteeseille oli vaikea löytää yhdenmukaisia tuloksia. Kaksi hypoteeseista oli todennettavissa tilastollisen aineiston perusteella, kolmen tulokset olivat ristiriitaisia, joten hypoteeseja ei voitu hyväksyä eikä hylätä. Aineisto tuki olettamusta, että rahoitusleasing on vastine velalle. Negatiivinen suhde on "trade-off" -teorian mukainen. Lisäksi taloudellisen ahdingon lisääntyessä yritykset turvautuvat yhä enemmän rahoitusleasingiin.

Avainsanat

Käyttöleasing, rahoitusleasing, Tobit regressio, logit regressio

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Abstract
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Determinants of leasing decision; International evidence

Purpose of the Study

The objective of the Thesis was to find determinants of leasing decision. Corporate and asset factors were considered. The determinants were studied for operating leasing and financial leasing respectively.

The study was conducted with international evidence. Therefore, the country specific element was checked. The research setting also enabled the study of industry variations and the size dependence.

Data

The data employed comprises of 25 countries for the time period of 1999-2003. The observation unit is firm-year. The extensive requirements for the data narrowed the total sample size to 66292 observations. The data was analyzed with Tobit and logit regression.

Results

The core results were the determinants for both leasing instruments. The determinants for operating leasing showed consistent results for three out of five hypotheses. The remaining two hypotheses were left unsolved, because of mixed results. It can be concluded that as the firm marginal tax rate declines the use of operating leasing increases. Also, as firm faces growth opportunities the proportion of operating leasing in the asset structure appears to increase. However, size hypothesis turned out contrary to expectations. Leasing seemed to increase with the size of the firm.

The hypotheses for financial leasing were also affected by the lack of consistence in the results. Conclusion was reached only for two hypotheses. The data supported the view that financial leasing is regarded as an alternative for debt financing. The substitutability effect is in accordance with the trade-off theory of asset structure. Evidence was also found to support the hypothesis that financially distressed firms would use more financial leasing.

Keywords

Operating leasing, financial leasing, Tobit regression, logit regression

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1 Introduction

1.1 Background and motivation of the study

Leasing instrument is an alternative source of finance. Instead of borrowing or taking a loan and purchasing the equipment there is the possibility of leasing it. Lease is according to Brealey and Myers (2000, 735) a rental agreement that extends for a year or more and involves a series of fixed payments. Under a lease agreement, the owner of an asset (the lessor) grants another party (the lessee) the right to use the asset during the specified term of the lease in return for a specified series of payments.

Leasing has become more and more popular over the last few decades. According to Leaseurope statistics, new leasing contracts in 27 European countries totalled 230 billion euro in 2004. The volume has been growing steadily over the years. The sample represents roughly 45 per cent of the 2004 total leasing volume worldwide. In Finland the amount of leasing contracts are also on the rise. However, compared to the other European countries the level of leasing utilized is one of the lowest. According to Statistics Finland in 2003 financial leasing totalled 1311 MEUR, a rise of 13 percent from the year 2002. Generally firms tend to lease e.g. cars, office electronics, industry machinery, but leasing can be exploited as well for much longer term investments. The market provides several entities offering lease financing for firms and even for individuals. Basically everything that has value in the secondary market is possible to lease.

The attractiveness of leasing is often explained by the "off-balance-sheet" financing nature. Operating leases and some financial leases ("true-leases"), are considered as rent in the accounting and, therefore, treated as an expense. If leasing is not recorded in the balance sheet as debt, naturally leverage would be lower and key figures would enhance, reflecting a healthier firm. It could be an attractive way for managers to manipulate the balance sheet and financial ratios with the use of leasing. This dubious reasoning may still be valid in certain countries of the world were accounting standards permit these type of entries. However, the trend is worldwide to improve the disclosure of financial statements which leads to consider financial lease and even operating lease similar to debt. The new standards would increase transparency and comparability of financial statements. However, it would naïve to believe

that shareholders and debt holders are fooled by manipulating asset structure, even under the present accounting standards.

Nonetheless, leasing holds several advantages. As Emery et al. (2004, 617) state i.e. more efficient use of tax deductions and tax credits of ownership, reduced risk when cancellation option exists, reduced cost of borrowing, and privilege position in bankruptcy proceedings. Also, sale to leaseback contracts enable efficiently to release capital from assets for reinvestment in core activities. Therefore, in certain conditions leasing can be a more attractive option of financing and be more cost efficient for the lessee.

There are many types of different leases available; the most common are operating leases, financial leases and sale and leaseback. The different leases vary in the legal, tax and accounting treatments and can be used for different types of contracts as the lessee wishes. The thesis concentrates on operating and financial leasing.

The thesis's research problem is to find determinants for the leasing decision. This study contributes the existing research on the field by applying international data. How does the international data affect the determinants' credibility and the results overall compared to the studies done in the past? What kind of differences appear between different countries and different industries in the leasing use?

1.2 Research problem and objectives

The broad aim of the thesis is to analyze determinants of leasing decision using worldwide data. The use of international data allows more data to be included, but also enables the study of leasing intensity variations between different countries. The data also provides the opportunity to study the differences between industries. More specifically, the thesis addresses three research questions:

1) First and most importantly, what variables could be determinants for leasing decision? Regression analysis is performed with several variables to find the possible determinants.

2) Applying worldwide data means applying data from different countries and from different accounting legislations. Are there differences between countries and what could be the explanatory factors?

3) The data set consists of firms from several different industries. How does the leasing propensity differ among the industries and what are the explanations for it?

1.3 Definitions

Financial lease is defined here as it is stated in the database (Worldscope) used for the financial lease data. The US FASB (Financial Accounting Standards Board) statement 13 defines the lease equally.

Financial lease imply ownership. The lease holder acquires essentially all the economic benefits as well as the risks of the leased asset. In order to qualify for a financial lease it must meet the following criteria:

1) The lease transfers ownership to the lessee at the end of the lease term.
2) A bargain price option should exist.
3) The lease term is 75 percent or more of the life of the asset.
4) The present value equals or exceeds the fair market value of the asset by 90%.

The IASB (International Accounting Standards Board) defines the criteria likewise, but does not give exact percentage figures for criteria three and four.

Financial leasing is normally reasonable for long-term investments. The agreement is similar to a loan agreement. The lessee receives an immediate inflow equal to the value of the asset. The lessee realizes this value as if it were cash, because it gets the exclusive use of the asset without having to purchase it. The firm also realizes the same stream of economic benefits (other than tax deductions) that it would have if it had purchased the asset. As in a loan agreement, specified periodic payments are expected for compensation. If the lessee fails to make timely lease payments, it runs the risk of bankruptcy, just as it would if it missed an interest payment or principal repayment on a loan.

Historically, all financial leases were "off-balance-sheet" financing. That is, lease obligations were not recorded directly on the balance sheet, but listed in the footnotes. The concealment of lease obligations in the accounting frequently resulted in a failure to state operational assets and liabilities fairly.

First in 1977 the Financial Accounting Standards Board (FASB), the rule-making body of the accounting profession, required that financial leases be recorded on the balance sheet as both an asset and a liability. This was in recognition of the long-term nature of a lease obligation. IASB has followed the ruling.

Current regulation under IAS 17 advices to record finance leases as an asset and a liability at the lower of the fair value of the asset and the present value of the minimum lease payments. Finance lease payments should be apportioned between the finance charge and the reduction of the outstanding liability. The depreciation policy for assets held under finance leases should be consistent with that for owned assets.

The lessor records a receivable in the current assets section against the lessee for the amount of the minimum lease payments plus the suggested residual value at the end of the primary lease term.

Operating lease does not imply ownership. The ownership and the use of the asset are separated. Operating lease is more often a short-term lease, but is not necessarily time limited. It is generally also cancellable. An operating lease does not compensate the lessor for the full costs because the lessor normally expects to take possession of the asset before the end of its useful life in order to release the asset or to sell it. Frequently, an operating lease permits the lessee the right to cancel the lease and return the equipment before the expiration of the original agreement.

FASB and IASB states that a leasing agreement will be considered an operating lease unless one or more of the four criteria defined above are met. The lessee can treat the lease costs as an expense and the lessor can depreciate the asset. In general, the lease payment details should be disclosed in the footnotes. The operating lease treatment in accounting is internationally viewed as “off-balance-sheet” financing. In essence, the lessee obtains 100 percent financing

for an asset, but is neither obliged to capitalise the leased asset, nor to record the contractual liability in the balance sheet.

1.4 Limitations of the study

The use of international perspective in the thesis sets limitations for the possible variety of determinants. The publicly available data from different countries varies a great deal. Because of sparse data from several countries the determinants chosen have to rely on fundamental financial statement items. Resulting, e.g. to the exclusion of the effect of executives' ownership to leasing.

The key assumption concerning the data is the treatment of missing leasing figures. Firm's leasing usage is assumed to be zero if the firm does not have leasing data available in the database. It is assumed that if the firm would have significant leasing contracts it would disclose them for the benefit of their investors. In reality the missing leasing data is not necessarily an indication of zero leasing usage. Several countries accounting legislations do not require the disclosure of leasing contracts. The effect of this distortion is discussed in the following chapters.

The thesis approaches the discussion of leasing, standards and legislations primarily from the FASB and IASB standpoint. The data contains 25 different countries, which all have their own technicalities. The decision has been made to have the mentioned standpoint as a guideline.

1.5 Structure of the study

The rest of the paper is structured as follows. Chapter 2 presents the literature and theory review with the existing research on the topic. The chapter introduces the framework of influencing factors. Chapter 3 provides the hypothesis for the study on the basis of the literature and theory review. Chapter 4 focuses on the data and presents in detail the applied methodology. The fifth chapter provides the empirical analysis. The analysis takes several approaches to test the hypothesis and their credibility.

2 Literature and theory review

The Modigliani-Miller's I proposition states that the firm's value is determined by its real assets, not by the securities it issues. That is, there is no difference between owning an asset and leasing an asset. However, the existing research on the issue doesn't support the I proposition. It appears the investment and financing decisions can not be completely separated from each other. Naturally in reality transaction costs and information asymmetries exist, distorting the I proposition's underlying.

Leasing has been a relevant research subject for decades already. The early literature on the subject concentrated on the tax considerations of leasing and on the extend it replaces other forms of borrowing. The later research has opened the focus to allow more variables to be included for the interpretation of the determinants. The research literature on the reasons for existence of leasing could be roughly divided to three main factors: tax differential, debt substitutability, and non-tax related determinants (asset factors, financial contracting costs, and financial distress).

Research on leasing has evolved over time. What is striking is the contradiction in the findings through time and different authors. Naturally the different assumptions, time span, proxy variables, and country specific differences generate result disparity. The disparity is also discussed in the forthcoming chapters.

2.1 Tax differential

According to the theory of financial leasing, if the lessor and the lessee face different effective marginal tax rates so that the lessor can make better use of depreciation tax shields than the lessee, it could be more cost efficient for the lessee to lease the asset than to purchase it. The lessor should pass some of the tax benefits to the lessee in form of lower lease payments.

Lewellen et al. (1976) and Myers et al. (1976) suggest that leasing creates value by allowing low-tax-rate lessees to transfer valuable depreciation and interest tax deductions to high-tax-rate lessors. The suggestion, therefore, assumes that these tax savings are passed on to the lessee in terms of lower lease payments, hence reducing costs and increasing profits. The

direction of the tax effect depends on the specific asset life, rate of depreciation, tax rate and capitalization rate. The lessee is benefiting the most when:

- The lessor's depreciation is accelerated, or received early on, in the lease period.
- The lessor has the higher tax rate.
- The lease period is long and the lease payments are concentrated on the end of period.
- The lessor has the higher interest rate.
- The lessor has higher borrowing rate.

The tax incentive is the key advantage for long-term leasing. Any tax benefits from leasing can be split between the two firms by setting the lease payments at the appropriate level, and both firms should benefit from the tax transfer arrangement. The loser will be the government.

The research in the 1970's considered leasing simple as a function of firm's tax status, which satisfied the theory. Studies such as Myers, Dill and Bautista (1976), and Miller and Upton (1976) found that in the absence of taxes neither lease nor purchase could be shown to dominate. The more recent studies performed in the 1980's challenged the results previously published. The newer research from Finucane (1988) and Ang and Peterson (1984) studied the relationship between a firm's lease usage and its average tax rate and found, on the contrary, no tax effect.

One reasoning for the mixed results was recognised in the Barclay and Smith (1995) and in the Sharpe and Nguyen (1995). Their studies emphasized the fact that according to the theory it is the marginal tax rate [the marginal tax rate is defined as the present value of current and expected future taxes paid on an additional dollar of income earned today (Graham, 1996)] not the average tax rate, which should influence the firm's financing and investment decisions. Their results did in fact support the assumption that lessees would tend to have lower marginal tax rates than lessors.

The findings of Barclay and Smith (1995) and Sharpe and Nguyen (1995) were based on the relation between the use of financial leases and taxes. Graham et al. (1998) stated that financial leases are likely a mixture of true leases and non-true leases and it is only the true leases that allow the transfer of tax benefits from lessees to lessors. The Internal Revenue

Service (IRS) in USA classified leases into true tax advantage leases if the following six guidelines were met. In short:

1) At inception and throughout the lease term the lessor must have an investment equal to at least 20 percent of the total acquisition cost of the asset.
2) The equipment's estimated residual value (in constant dollars without adjustment for inflation or deflation) at the expiration of the lease term must, at lease commencement, be projected to equal at least 20% of its original value.
3) The lease term (including any extensions or renewals at a predetermined fixed rental) must not exceed 80% of the estimated useful life of the equipment at the commencement of the lease transaction.
4) Neither the lessee nor any related party can have a right to purchase the asset from the lessor at a price less than its fair market value at the time of the purchase.
5) Neither the lessee nor any related party can pay, or guarantee payment of, any part of the price of the leased equipment.
6) The lessor must be able to demonstrate the expectation of profits to be derived from the lease.

FASB (FAS 13) used instead four criteria (as defined in chapter 1) to classify leases as financial leases. In most cases, it could be that a lease is considered as a financial lease under accounting standards, but not qualified such under IRS tax law. This result in considering the lease similar financial instrument as debt under taxation and, therefore, tax transfers are not allowed to the same extent. Comparing the classification method employed by the IRS to that employed by FASB, Graham et al. (1998) concluded that operating leases were most likely true leases while financial leases were most probably a mixture of "true leases and non-true leases" and decided to focus on the relationship between the firm's operating lease usage and its marginal tax rate. Graham et al. (1998) stated that they believed their results were the first definitive evidence supporting the hypothesis that, all else being equal, low tax rate firms lease more than high tax rate firms.

Graham et al. (1998) (as have Lewis and Schallheim, 1992) point out a problem with the relation between the financing decision and tax proxies in several studies. Since both interest expense and lease payments are tax deductible, a firm that finances its operations with debt or leases reduces its taxable income, potentially lowering its expected marginal tax rate. The

endogenous of the tax rate can bias an experiment in favour of finding a negative relation between leasing and taxes and against finding a positive relation between debt and taxes if the tax proxy is not properly addressed.

The proxies used for taxes in various studies have not taken into account that a firm's current debt and leasing positions are the cumulative result of many past financial decisions. Because most measures of tax status are affected by earlier financing decisions, these measures can induce a false relation between the measured debt or leasing position and tax proxy. For example Graham at al. (1998) have doubts that this problem may have affected Sharpe and Nguyen (1995) study. The difficulty of selecting a valid proxy is discussed further in chapter 4.2.

2.2 Debt substitutability

The financial trade-off theory of capital structure suggests that within a given capital structure debt and financial leasing are substitutes. Target optimum debt ratio of the firm is defined balancing interest tax shields and the costs of financial distress. Both financial leases and debt are fixed, contractual obligations that reduce the firm's debt capacity. For optimum debt ratio to hold the relationship between debt and leases need to be negative.

There a three variants of magnitudes for the substitution coefficient. Traditional finance theory considers cash flows from lease obligations equivalent to debt cash flows, thus the trade-off between debt and leases is one-to-one. Some theorists claim that differences in the nature and in the terms of lease and debt contracts, cause lessee to use less debt capacity than an equivalent amount of non-lease debt, thus the substitution coefficient is less than 1. Finally, some argue that since leased assets may be firm-specific, therefore, the risk of moral hazard would be higher, which could result in the substitution coefficient to be greater than one.

For example, the papers Myers et al. (1976) and Franks and Hodges (1978) assume for their theoretical framework that financial lease payments, which are fixed obligations like other loans, displace debt on a one-to-one basis and reduce debt capacity as the traditional theory predicts. Graham et al. (1998) provide support for this type of theoretical framework. They concluded that their debt results are consistent with the trade-off theory of capital structure.

The financial leasing results mirror those for debt, suggesting that financial leases and debt are similar financial instruments

Marston and Harris (1988) also find empirical evidence supporting the substitutability between leases and debt by focusing on year-to-year changes in lease ratios and debt ratios rather than on levels. The changes were measured relative to a policy of maintaining a constant proportion of assets financed by leasing and by debt. The proportion was measured as the average over a pre-study 3-year period. They concluded that, at the margin, the use of lease financing substitutes for other forms of short-term and long-term debt instruments. Interestingly however, their study also revealed that firms employing lease financing typically use higher levels of debt compared to firms that do not use lease financing. But then again, their results were affected by their different approach on the variables. They chose to consider the relation between total leasing (financial leasing combined with operating leasing) and total debt (long-term debt combined with all other liabilities). Hence, comparison of studies is troublesome.

Mukherjee (1991) has taken a different approach to analyze corporate leasing. He constructed a questionnaire for 103 firms on the Fortune 500 list. One section of the questionnaire dealt with the relation between leasing and debt. Out of 83 respondents 47 percent viewed leasing and debt substitutes, 22 percent as complements and finally 31 percent believed that one has no bearing on the other. The size of the firm appears to influence the opinions. While 71 percent of the largest group (more than $10 billion in assets) viewed leasing as a substitute only 31 percent of the smallest group ($1 billion or less) shared the view. The key reason given by firms for the opinion of substitution effect was that the borrowing capacity is determined by the ability to cover fixed charges including lease costs of which rating agencies, analysts or lenders are cognizant. The complementary view gained support among those firms which employed mainly operating leases. The view was justified by the off-balance-sheet nature of operating leases. The portion answering "no bearing on the other" was influenced by an insignificant leasing activity. Mukherjee also reflected the opinions in answers on how the firms actually calculate and analyse the financing decisions. It appeared, at least for some firms that their opinion of the debt-lease relationship was not in accordance with their true financial decisions. The findings mirror the strength of the prevailing dubious believes of leasing.

By contrast, the empirical evidence on the theory has shown controversial results. Not all researchers find evidence for substitutability. For example Bowman (1980) evidenced a positive correlation between relative levels of debt and leases. The evidence supported the complimentary view that firms which issue more debt tend to use more leasing. As well, Ang and Peterson (1984) informed of complimentary results. They attempted to control the differences in debt capacity by including six additional financial variables in the regression model: operating leverage, sales variability, profitability, expected growth, size and liquidity.

The study by Smith and Wakeman (1985) on the determinants of corporate leasing policy was somewhat a continuation for Ang and Peterson's (1984) research. Smith and Wakeman decided to consider also other type of determinants for leasing use. Their study addressed the problem of mixed results by showing that firms with higher debt capacity could actually have other characteristics that make leasing relatively attractive. It seemed as the previous studies had failed to see further and failed to control the different characteristics of the specific assets and their influence on debt capacity.

The results are mixed with the theory. One possible explanation for the mixed views is shown in Smith and Wakeman (1985) as well in Graham et al. (1998). The problem also affects the relationship between leasing and taxes and was already touched in the taxes section. Lewis and Schallheim (1992) demonstrated at a theoretical level that debt and leases can be complements because debt reduces the firm's effective marginal tax rate and thus creates an incentive for the firm to lease. They assumed that the substitution is between debt and non-debt tax shields. Leasing (especially operating leasing) offers the opportunity to transfer or "sell" non-debt tax shields. As non-debt tax deductions are sold, their potential redundancy with debt deductions is reduced and the marginal value of debt becomes positive, inducing the firm to increase debt rather than to decrease it. The explanation can not reject the hypothesis of substitutability, but provides a view that complementarity is possible. All in all, the dilemma of substitution vs. complementarity is yet unresolved.

2.3 Non-Tax related determinants

The study by Smith and Wakeman (1985), as was discussed earlier, raised the attention of researcher to also consider other incentives influencing the lease-versus-purchase decision. Smith and Wakeman (1985, 899) observe that "The coexistence of both leased purchased

assets (in the same firm) suggests that the net benefits of leasing (for that firm) are uniformly neither positive or negative." Thus, two firms with identical tax situations and costs of external financing may have different leasing policies. Therefore, there has to be also other factors influencing the decision to lease. Their study opened the focus from not just identifying potential lessees and lessors using tax related determinants, but to identify the variety of non-tax determinants. They decided to address the observable asset and firm characteristics that are important for lease-versus-purchase decision. Altogether they identified eight non-tax incentives. They conducted a managerial analysis and found that in the following cases leasing is more likely than buying an asset:

- The value of the asset is less sensitive to use and maintenance decisions
- The asset is not specialized to the firm
- The expected period of use is short relative to the useful life of the asset
- Corporate bond contracts contain specific financial policy covenants
- Management compensation contracts is based on ROI
- The firm is closely held so that risk reduction is important
- The lessor has market power
- The lessor has a comparative advantage in asset disposal

The following chapters discuss the different non-tax incentives in depth.

2.3.1 Asset factors

Testing the asset related incentives of leasing is difficult since it would require insider information of the specific assets and the contracts. Generally studies are done on the basis of public financial statement information so proxy variables have to be created. For example Finucane (1988), using an industry factor as a proxy, found that indeed if the asset is not specialized for the firm leasing seems as a more likely option.

Krishnan and Moyer (1994) had same kinds of findings, recording statistically significant results that leasing firms and non-leasing firms are significantly different in their financial characteristics and the use of leasing differs between industries. Their sample consisted of 98 leasing and 410 non-leasing firms. The sample was divided into seven industry groups: mining, construction, manufacturing, transportation, wholesale trade, retail trade and services.

The variable was defined as financial leases divided by total assets. The lowest level of financial lease was found to be on manufacturing industry (0.03%). The outcome is no surprise. Manufacturing industry's asset characteristics with high specificity explain the negativity to leasing, as Smith and Wakeman (1985) predicted in their study. On the contrary, the highest proportion was on transportation (0.12 %); an industry where the asset characteristics are the opposite. The second highest user of financial leases was services sector (0.09%). The result could be considered as a bit of a surprise keeping in mind that the question was on financial leases. At first glance services sector could be associated as a heavy user of short-term, cancellable operating leases, and not so much as a user of long-term financial leases. The authors emphasize that service sector is diverse and holds a variety of business concepts, which might explain a portion of the finding. Yet, the sample size was relatively small and might have affected the results. The other industries' (mining, wholesale trade, retail trade) lease proportions fell in between (0.05 %). The industry grouping used in this thesis is the same excluding mining sector. Also financial leasing variable is defined accordingly. Therefore comparison of results is possible.

Firm size has also been used as a proxy for assets in several studies. It is theorized that large firms are more likely to be debt financed than smaller firms. For instance the larger the firm the better ability it has to redeploy assets internally. Redeployment could come in question if the asset is purchased only for a short period of time and becomes obsolete for a certain specific purpose, but still might be useful for some other use. Barclay and Smith (1995) used size proxy (log of firm value) in their study. Using Tobit regression they found that a larger firm would use less financial leasing than a smaller one. Sharpe and Nguen (1995) found support for the same hypothesis. Using a sample of about 2000 observation per year from 1986-1991, operating leasing was negatively related to firm size. However, size proxy is not necessarily a good estimate for asset factors. As the next section highlights, size and financial contracting costs have a strong interconnection and might affect the interpretation of asset related results.

2.3.2 Financial contracting costs

"Financial contracting motivations arise when outside investors are less informed than firm insiders regarding ongoing operations of future prospects, or when conflicts of interest

between classes of corporate claimants are costly to resolve." (Sharpe and Nguyen , 1995, 272).

Financial contracting costs weigh especially in times when: agency problems give rise to monitoring costs, outside financing is costly, and growth opportunities exist. The information asymmetries are, for example, one of the factors why smaller firms are likely to face higher costs for obtaining external funds. Sharpe and Nguyen find strong support for the hypothesis that firms likely to face high financial contracting costs also have a significantly greater propensity to lease: the proportion of their total annual costs of fixed-capital usage incurred under leases is substantially higher than at firms relatively unhampered by such financial constraints.

Asymmetric information affects the choice between internal and external financing and between new issues of debt and equity securities. The effects of asymmetric information have led to the development of pecking order of capital structure theory. The core of the theory is recognition that investments are financed first with internal funds (reinvested earnings primarily), then by new issues of debt, and finally with new issues of equity. Yet, the theory does not regard leasing as a source of financing. Even so, Erickson and Trevino (1994) have taken a pecking order approach to leasing. Their purpose is to gain insight into the determinants of leasing by using an airline industry case. They state that within the pecking order theory, leasing is predicted to be negatively related to profitability over time and positively related to asset growth as debt is. Also, leases increase with growth in assets and are inversely related to sales growth. They conclude that their results indicate that the pecking order also applies to leasing.

Studies have shown that also growth opportunities do have an effect on leasing. Myers (1977) argued that shareholders of a firm with risky fixed claims in its capital structure will potentially forgo positive NPV investments if project benefits accrue to the firm's existing bondholders. Myers argues that the underinvestment problems arising from the conflict between bondholders and stockholders can be reduced by reducing the amount of debt in the firm's capital structure, by including restrictive covenants in the indenture agreements, or by shortening the maturity of the debt. According to Stulz and Johnson (1985) these incentive problems could be reduced if the firm preserves the right to finance new investments with high priority claims, such as secured debt or leases. Therefore, firms with a higher proportion

of growth opportunities should use less debt financing to reduce the underinvestment problem. Barclay and Smith (1995) found, using market to book ratio as a proxy for the relative importance of growth opportunities, that firms with greater growth opportunities rely more heavily on financial leasing and less on debt. This is as hypothesised; leasing does become a more attractive alternative at the expense of debt. With this proxy, once again, the results are mixed. Graham et al. (1998) found on the contrary a negative correlation, even though both studies applied very similar data and techniques.

Ezzell and Vora (2001) have discussed the problem of moral hazard. The lessor, as the owner of the asset, ultimately bears the risks of the leased asset. The leased asset's salvage value accrues to the lessor, which leaves the lessee with no incentive to preserve the salvage value. The problem arises if information between the lessor and the lessee is asymmetric, as it is in reality. Not knowing whether a particular lessee is a careful user or an abuser, the lessor responds by including various provisions on the lease contract that encourage more careful use of the asset (e.g. penalty clauses, metered lease payments). Therefore, since the cost of leasing increases as the sensitivity of the asset value to use and maintenance decisions increase, there is an optimal point after which it is more cost efficient to purchase the asset rather than to lease. The data used for the study was selected from The Wall Street Journal articles containing detailed lease contract announcements from years 1984-1991. It enabled to identify the type of leasing contract and the asset involved. Their evidence supported the prediction that the gain from leasing is lower for assets whose values are more sensitive to use and maintenance decisions.

2.3.3 Financial distress

In financial distress circumstances the importance of information asymmetries is emphasized and influences directly the lease-versus-purchase decision.

In presence of potential financial distress leasing can be a highly desirable financial contract. The different treatment of debt and leases in case of severe financial distress does have a material effect on the lease vs. purchase decision. Compared to debt, at least in USA, leases have a higher priority in bankruptcy (see, Barclay and Smith, 1995). In case a firm can not meet its obligations to the debt and lease claimholders they can generally force the firm into bankruptcy. Under Chapter 7 the firm is liquidated, assets sold and the proceeds are

distributed to the firm's claimholders according to their priority. Because lessors have higher priority than debtors, they can repossess their leased assets first. However, often firms file under Chapter 11, which permits to reorganize the firm's outstanding contracts and help the firm to solve the crisis. If the court sees the leased asset to be essential for the firm, for its operations, it can require the leased assets to be left to the lessee and require that the lessee continues the lease payments to the lessor. In fact, the lessor's entire claim (including delinquencies, late fees, and other damages suffered) is classified as an administrative claim, which is comparable to employee and management compensation, and must be paid immediately. In contrast, debtors are not paid until the bankruptcy process is resolved. In both cases, Chapter 7 and 11, lessors are in a better situation than debtors.

Therefore, based on the last paragraph, lease financing has lower associated bankruptcy costs to the lessor than debt has to the lender. Because the lessee must compensate the lessor for expected bankruptcy costs, a firm with bankruptcy potential will find leasing to be available at a lower cost than debt financing. In fact, it could be the only alternative in such a situation.

Graham et al. (1998) assumed that a firm with a high probability of entering financial distress is likely to able to ex ante arrange lease financing on more favourable terms than other forms of financing, such as issuing bonds. They evidenced, using Z-score and their own ex-ante financial distress measure, that the propensity to use either operating or financial leasing (use debt) increases (decreases) with the expected costs of financial distress.

Krishnan and Moyer's (1994) study on bankruptcy costs and the financial leasing decision support the same outcome. Their results, using Z-score as a proxy, suggest that as bankruptcy potential increases, ceteris paribus, financial leasing becomes an increasingly attractive financing option in the pecking order of alternatives. The higher transactions costs that normally affect lease agreements versus secured debt agreements are offset as bankruptcy potential increases. Leasing is shown to involve lower bankruptcy costs than borrowing. They conclude that as a consequence, financial leasing should be used by riskier, less established firms.

Many of the studies analysing the effect of financial distress to leasing have used Altman's (1968) Z-score as a proxy variable. The Z-score figure estimates the likelihood of bankruptcy, the larger the figure the lower the financial distress. The thesis makes an exception and does

not adopt the Z-score as a valid indicator. Altman has conducted the study with 60's data, from which the business world has changed remarkable. To provide similar kind of estimate the thesis adopts Ohlson's (1980) O-score, which reminds Z-score closely but is newer.

2.3.4 Other determine factors of leasing decision

The list of non-tax incentives for leasing by Smith and Wakeman (1985) still holds three highlights that have not been discussed.

- Management compensation contract is based on ROI
- The firm is closely held so that risk reduction is important
- The lessor has market power

Often management are given compensation plans which include provisions to encourage the executives to maximize the value of the firm. In case the compensation is accounting based and determined by return on investment –ratio, leasing will become an attractive option of financing for management. If the firm would choose to purchase an asset the denominator of ROI would increase and therefore the ratio result would decline. The significance of the leasing effect would depend on the size of the firm and the monetary value of the asset. In certain occasion the option to lease, use off-balance-sheet financing, would be highly attractive for the management.

A small firm, especially a small proprietor, would find leasing helpful if risk reduction is needed. Ownership of capital assets makes it more difficult for the owner to reduce risk through diversification. The owner can reduce the problem by leasing and transferring the risks partially to lessors. Leasing thus reduces the concentration of wealth on one activity, and can facilitate a more efficient allocation of risk bearing (Smith and Wakeman, 1985).

Occasionally, leasing could be simply just a more cost efficient alternative than purchasing the asset. If the lessor has market power it could be able to offer assets with a more competitive prices. It could be possible if e.g. a manufacturer has enough market share to control the supply of assets and acts also as a lessor.

2.4 Future of leasing from the accounting perspective

The need for common international accounting standards has been relevant for years. The G4+1 group (a group of standard setters from Australia, Canada, New-Zealand, the UK, the USA, and International Accounting Standards Committee [IASC] as an observer) worked years toward common reporting standards in the member countries (Troberg 2001). The group ended its operations in 2001 when IASB was established to replace IASC. However, before the end, the group released two discussion papers on accounting of leases. The first was released in 1996, "Accounting for Leases: A New Approach -Recognition by lessees of Assets and Liabilities Arising under Lease Contracts." The second was published in 1999, "Leases: Implementation of a New Approach." The first paper concerned the national and international deficiencies in accounting standards of leasing.

The key discussion evolved on the proposal to improve the discloser of leasing contracts. The main weakness was considered to be the undisclosed operating leasing contracts. One could not judge the amounting assets and liabilities of the contract. In order to improve comparability and transparency, it was suggested that all leasing contracts, both financial- and operating leases, would be reported the same way on the balance sheet as assets and liabilities. Therefore, the artificial definition of leases to financial- and operating leases, could be abolished. The second paper released in 1999 continued the discussion on the improvements. The two papers are a matter of interest, because the current IAS 17 upgrade on leasing is based on the G4+1 amendment.

The proposed changes have their pros and cons. Where e.g. analytics are for the amendment, the parties selling and using leasing instruments have been wary of the idea. The side using the financial statement information has emphasized the improvements of transparency. Opposing arguments from the preparers of financial information have reminded that the consistence of accounting standards would not hold. The contracts should not be capitalized as the same is not done for other similar contracts. By nature, the contract holds economical value as it accrues benefits in the future, but the same can be said about e.g. employment contracts, or long-term service contracts, and these do not have to be capitalized.

Beattie et al. (2001) conducted a survey to analyze the opinions on the possible reform. They addressed both sides of the discussion. The survey was sent to 472 analysts and to 415

financial officers. Overall, the results indicated that both preparers and users agree that there are difficulties with the current lease accounting standards, but disagree on the resolution of these difficulties. Both groups recognize that the G4+1 proposals would bring about major changes and would lead to significant economic consequences for lessees and lessors. However, they have differing views on the balance between costs and benefits of the proposals and, therefore, also on whether the proposals are acceptable. They concluded that the divergence in opinion indicates the need for accounting standard setters to investigate thoroughly the views and needs of users.

The presence of such a radical change to the standards could possible increase the use of operating leasing. The idea would be to enter into as many operating leases as possible, as the benefit still exists. If and when the new standard is implemented, it could be possible that it would not be applied to the existing contracts. However, I do not expect this hypothetical possibility to have an effect on my results.

3 Hypotheses

The hypotheses are based on the theory chapter. The availability of data has limited the number of possible hypotheses.

Tax differential hypothesis

Hypothesis is in line with the theory. I am expecting to find negative relation with operating leases, and positive with financial leases. Finance leases are likely non-true leases which gives a reason to treat them equivalent of debt. Before financing marginal tax rate is estimated according to Graham (1996) to proxy the tax effect. The effect of international data to the results has to be considered.

H1: Marginal tax rate is negatively related to the probability of operating leasing.
H2: Marginal tax rate is positively related to the probability of financial leasing.

Debt substitutability hypothesis

Leverage is calculated to determine the role of debt on leasing. The greater the debt the more should be the use of operating leases, because of tax and financial distress issues. Hence, I take the optimistic view of complementarity for operating leasing based on the recent research and neglect the original theory. For financial leases instead, since it is nearly the equivalent of debt financing, I assume a negative relation which is inline with the theory.

H3: Leverage is positively related to the probability of operating leasing.
H4: Leverage is negatively related to the probability of financial leasing.

Asset factor hypothesis

It is expected that the larger the firm, the better the ability to find alternative functions for the asset and to rotate the asset within the firm. Also more likely the firm can find an economically efficient way to dispose the asset. Thus, larger firm can better materialize the benefits of purchase at the expense of leasing benefits. Firm size is measured in sales.

It is also assumed that the less specified the asset is for the firm the more likely it will lease it. It is assumed that e.g. manufacturing, for its specific asset characteristics, will not be using

leasing to the same extent than the other industries. SIC-codes are applied to differentiate industries.

H5: Size of the firm is negatively related to the probability of operating and financial leasing.
H6: The more specific asset characteristics the industry has the less likely leasing is used.

Financial contracting cost hypothesis

Hypothesis will be according to the agency cost framework and in line with the results of Barclay and Smith (1995). Firms with greater growth opportunities rely more heavily on lease financing. Proxy for growth opportunities is market to book ratio.

Firm size, measured in sales, can be used as proxy for asset factors but as well for financial contracting costs. The smaller the firm the more significant the asymmetric information costs. In a large firm the quality of outsider information is better and the premium on debt financing will be lower than it would be for a smaller firm. Therefore, smaller firms should use more leasing than larger firms in this respect. The assumption is in line with hypothesis H5.

H7: Market to book ratio is positively related to the probability of operating and financial leasing.

Financial distress hypothesis

Leasing is shown to involve lower bankruptcy costs than borrowing. Therefore the propensity to lease should increase with the expected costs of financial distress. Ohlson's (1980) O-score is used as a proxy for financial distress.

H8: O-score is positively related to the probability of operating and financial leasing.

Table 1 below sums up the above presented eight hypotheses.

Table 1. Summary of hypotheses

Hypotheses	Proxies	Expected relation with operating leasing	Expected relation with financial leasing
Tax differential hypotheses	1) Marginal tax rate	−	+
Debt substitutability hypotheses	1) Leverage	+	−
Asset factor hypotheses	1) Size of the company 2) Specialized assets	− −	− −
Financial contracting cost hypotheses	1) Market to book ratio	+	+
Financial distress hypotheses	1) O-score	+	+

4 Data and methodology

4.1 Characteristics of data

The core of the thesis is the empirical evidence gathered from the several different Thomson Financial databases. As the thesis topic reveals the study uses international evidence. The decision has been made to restrict the number countries involved to 25 on the basis of the available data for operating leases. The number of firms on the data set for each country varies a great deal, varying from 8000 firms to 50 firms. For each country, the firm selection is the entire firm selection that exists in the Worldscope for that particular country. Data is collected for the time period of 1999-2003.

Having chosen an international focus for the research brings up interesting research questions from the international use of leasing. On the other hand, the difficulty of gathering sufficient amount of reliable data influences negatively the results. The different accounting legislations involved in the data set influence the data's accuracy and the availability. In several countries, e.g. Finland, disclosure of leasing contracts is not mandatory on the financial statements. Especially data from operating leases is sparse. Extel-database has a variable ContingenciesLeaseCommitments which holds the total amount of operating leases for a firm. Operating leases are disclosed in the financial statement notes if the firm has seen it necessary (if not mandatory). The assumption is made that if the operating leases should be in an important role for the firm, it would disclose them in the financial statements and, therefore, the data would be available in the database. Thus, the firms that do not have data for operating leases in the database are assumed to use very little operation leases and are considered to have zero operation leases. The same underlying assumption applies for financial leases.

Collection of firm-year observations from the five year period holds a considerable amount of missing data. Each firm-year is treated as an independent observation. The missing firm-years are excluded from the total sample.

4.2 Variable description

The variables chosen to the thesis are similar as have been used in other studies performed on the subject. However, the international focus does set limitations for the availability of data and, therefore, some changes have had to be implemented.

4.2.1 Dependant variables

Operating leases to total assets is the amount of operating leases outstanding in the firm's financial statement divided by total assets. The operating lease is taken from the Extel-database using item ContingenciesLeaseCommitments. The item is defined as future operating lease commitments in respect of tangible fixed assets.

$$Operating\ Lease = \frac{Contingencies\ Lease\ Commitments}{Total\ Assets} \qquad (1.1)$$

Financial leases to total assets is the amount of financial leases outstanding in the firm's financial statement divided by total assets. The financial lease is taken from the Worldscope-database using item DebtCapitalizedLeaseObligations. The database considers contract to be a financial lease if the lease holder acquires essentially all the economic benefits as well as the risks of the leases property. The exact definition can be found in the introduction.

$$Financial\ Lease = \frac{Debt\ Capitalized\ Lease\ Obligations}{Total\ Assets} \qquad (1.2)$$

4.2.2 Explanatory variables

The explanatory variables chosen to the thesis are in line with the variables discussed in the literature review. The variables are as follows:

Taxes: It was discussed in the literature review that the tax proxy has to be carefully chosen to not bias the result in favour of finding a positive relation between debt and taxes and a negative relation between leasing and taxes. Graham et al. (1998) noted that if a firm used debt or lease financing, its expected marginal tax rate would be lowered because both interest payments and lease payments are tax deductible. Thus, the expected marginal tax rate is endogenously affected by the financing decision. To avoid the problem, before-financing

marginal tax rate has to be implemented. The tax rate is not endogenously affected by the financing decision.

Graham (1996) has studied multiple alternative proxies that try to predict the perfect foresight for corporate marginal tax rate. He suggests that one reasonable alternative to estimate the marginal tax rate would be to use statutory marginal tax rate. The proxy is obtained from applying the statutory federal tax schedule to contemporaneous taxable income, net of any net operating loss carryforwards. The statutory rate is set to zero for negative income firm-years. KPMG's Corporate Tax Rate Surveys 2000-2004 have been used for statutory tax rate variable.

(1.3)

$$Tax\ Rate = \frac{(Income\ Before\ Income\ Taxes - Unused\ Net\ Operating\ Loss\ Carry\ Forward) * Statutory\ Tax\ Rate}{Income\ Before\ Income\ Taxes}$$

Debt: Proxy for debt will be leverage. It is defined as a ratio of book value of total long – term debt net of financial leases to total assets.

$$Leverage = \frac{Total\ Long\ Term\ Debt - Debt\ Capitalzed\ Lease\ Obligations}{Total\ Assets} \qquad (1.4)$$

***Asset factors*:** Firm size is used as a proxy for asset factors. Size is measured in sales to avoid correlation with the dependant variable.

$$Size = Log(sales) \qquad (1.5)$$

The different industries studied in the thesis serve also as a proxy for asset factors. Using SIC-codes six industries are identified: transportation, construction, manufacturing, wholesale, retail, services. Table 2 groups the two digit SIC-codes. If a firm operates on several industries the core industry is the classifying.

Table 2. Industry SIC-Codes

INDUSTRY	TWO DIGIT SIC-CODES
Construction	15-17
Manufacturing	20-39
Transportation	40-47
Wholesale trade	50,51
Retail trade	52-59
Services	70-89

***Financial distress*:** To measure the financial distress situation I use Ohlson's (1980) O-score. O-score varies from 0 to 1. The closer the score is to 1 the higher the probability of bankruptcy. I use the original O-score.

$$O-Score = \frac{1}{(1+e^{-NV})} \qquad (1.6)$$

Where NV =

*-0.407 * log(total assets / GNI price-level index)*
*+6.03 * total liabilities / total assets*
+0.075 * working capital / total assets
*-1.43 * current liabilities / current assets*
*-2.37 * Net income / total assets*
*-1.83 * (IncomeBefIncomeTaxes - DepreciationDeplAmortExpense) / total assets*
*-1.72 * [one if total liabilities exceeds total assets, otherwise 0]*
*+0.285 * [one if net income was negative for the last two years, otherwise 0]*
$-0.521 * (NI_t - NI_{t-1})/(|NI_t| + |NI_{t-1}|)$
*-1.32 * Constant*

***Financial contracting costs*:** To analyse the growth opportunities firms have, several studies have used market value divided by book value of the firm as a proxy for the relative importance of growth opportunities and so is done in this thesis also.

$$Market\ to\ Book\ ratio = \frac{(Annual\ Market\ Price\ High + Annual\ Market\ Price\ Low)/2}{Book\ Value\ Per\ Share} \qquad (1.7)$$

Country factors: The research problem also requires studying the use of leasing between different countries. For that reason country dummies are included to the regressions. The number of countries is set to 25 and therefore 24 country dummies are included, keeping USA as the reference country. Table 3 below summarises the countries involved in the study.

Table 3. Country codes and names involved

Country Code	Country								
AUS	*Austria*	CHN	*China*	GBR	*Great Britain*	JPN	*Japan*	SWE	*Sweden*
AUT	*Australia*	DEU	*Germany*	HKG	*Hong Kong*	MYS	*Malaysia*	THA	*Thailand*
BMU	*Bermuda*	DNK	*Denmark*	IND	*India*	NLD	*Nederlands*	TWN	*Taiwan*
CAN	*Canada*	FIN	*Finland*	IRL	*Ireland*	NZL	*New Zealand*	USA	*Usa*
CHE	*Switzerland*	FRA	*France*	ITA	*Italy*	SGP	*Singapore*	ZAF	*South Africa*

4.3 Description of data

Table 4 below reports for both financial instruments the fraction of total observations which hold non-zero leasing values. Table also presents the fraction of firm-years which have both leasing instruments employed at the same time. The fractions hold considerable well even for each country individually. Especially the low percentage of financial leases emphasizes the need to carefully interpret the results. How does the underlying assumption to treat missing leasing data as zero value influence the results? Some insight to the question can be found from the study of Krishnan and Moyer (1994). They used the same assumption that if no data exists in the database no leasing is used. To analyse the effect of the assumption they randomly selected 25 firms out of their 410 firms which did not use financial leasing. For those 25 firms they examined the notes of the financial statements. Only 3 of the 25 firms had financial leases, identified as being noncancellable, that were not reported on the balance sheet. The capitalized value of these leases was low, ranging from 0.4 percent to 1.2 percent of total assets. Therefore, the underlying assumption would not necessarily be considerably misleading. On the other hand, if the ratio (12%) would hold also on this thesis it would correspond to about 5800 extra observations for the non-zero financial leasing sample, which is about one third of the current sample size. That might have an effect at least on the significance of the results. However, the data sample Krishnan and Moyer (1994) use can not be directly compared to one applied here. Their data was from the Disclosure Database and included the years 1984-1986.

Table 4. Percentage of Firm-Years with leases in their capital structure

The sample consists of 66292 firm-year observations from years 1999-2003, from 25 countries, and from following industries: construction, manufacturing, retail, service, transportation, and wholesale.

Operating leases	Financial leases	Both
39 %	26.3 %	14.60 %

As the figure 1 below clearly shows the firm-year observations are strongly concentrated to two countries, USA and Japan. Almost exactly half of the observations are from these two countries. The significance of the results from the less represented countries could be jeopardised. The country differences are discussed further in the results chapter.

Country	Percent	N
BMU	0.05 %	34
IRL	0.24 %	161
AUT	0.36 %	238
NZL	0.43 %	288
DNK	0.74 %	489
FIN	0.76 %	505
NLD	0.96 %	636
ITA	1.04 %	690
CHE	1.08 %	718
ZAF	1.29 %	856
SWE	1.51 %	1002
THA	1.63 %	1083
IND	2.26 %	1497
SGP	2.38 %	1575
CAN	2.94 %	1950
AUS	3.09 %	2047
TWN	3.12 %	2069
MYS	3.56 %	2359
HKG	3.63 %	2404
DEU	3.93 %	2608
FRA	3.99 %	2643
CHN	4.02 %	2665
GBR	6.40 %	4246
JPN	21.82 %	14466
USA	28.76 %	19063

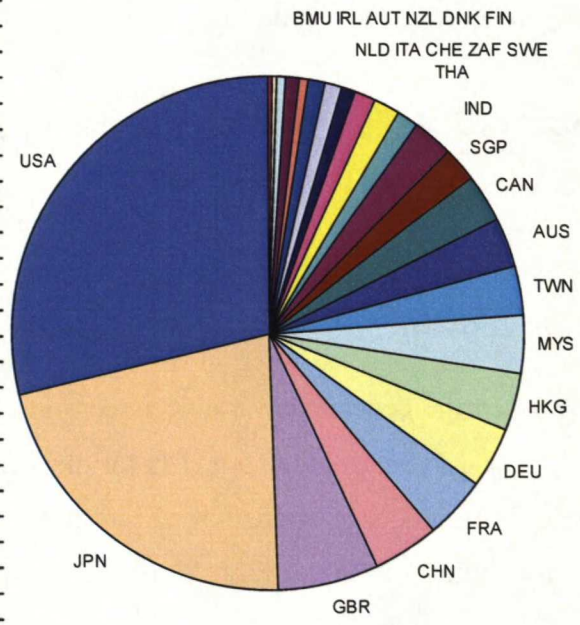

Figure 1. The country distribution of firm-years

4.4 Methodology

The main empirical analysis method applied in the thesis is regression analysis. The method uses independent variables to explain the observed variations of the dependent variable. Often used method is linear regression which is applied for standard distribution variables. However, as the table 4 reported, the dependant variables are heavily concentrated at zero and do not meet the standard distribution requirements. Therefore, ordinary least square regression (OLS) method is not applicable for the total sample. The thesis does apply OLS-method on few instances when the zero values are extracted and standard distribution requirements are satisfied.

The total sample characteristics require the use Tobit analysis. The Tobit regression's maximum likelihood estimation method can be used for truncated regression models. Also, for robustness check logit regression is applied. The model is a discrete model, because the dependent variable has to be classified to two or more categories. In this thesis, the dependent variable takes value 0 if no leasing is used and 1 if leasing is used to any degree. Thus, the dependent variable can only belong to one of the two categories. Since the dependant variable only has two outcomes the discrete model is called binomial logit model. Should there be more outcomes the model would be called multinomial logit model.

Operating leases and financial leases are kept separate, distinct regression equations are formed for both. Both dependant variables have the same independent variables in the regressions.

4.4.1 Tobit regression model

The model is appropriate when the dependent variable is censored at some upper of lower bound or at the bound. This means that all the data exists for independent variables x, but for the dependent variable y, only some observations have been made and the rest fall above or below a certain limit (normally zero) or at the limit. For my sample the censoring occurs at the lower bound, the model is:

$$y = 0 \quad \text{if} \quad y^* =\leq 0, \qquad y = y^* \quad \text{if} \quad y^* > 0 \tag{1.8}$$

The underlying latent variable y* can be modelled as:

$$y_i^* = \beta' x_i + \varepsilon_i \quad \text{and} \quad \varepsilon_i \sim \mathrm{N}(0, \sigma^2) \qquad i = 1,2,....,n \tag{1.9}$$

But it is the y that is observed:

$$y_i = \max(0, y_i^*) \tag{1.10}$$

The Tobit model uses maximum likelihood estimation (MLE) to estimate both β and σ for the model. The β estimates the effect of x on y*, the latent variable, and not on y. The likelihood function of the Standard Tobit model is given by:

$$L = \prod_0 [1 - \Phi(x_i'\beta/\sigma)] \prod_1 \sigma^{-1}\phi[(y_i - x_i'\beta)/\sigma] \qquad (1.11)$$

where Φ and ϕ are the distribution and density function respectively of the standard normal variable. For a detailed presentation of the estimation procedures see Greene (2000). The Tobit maximum likelihood estimation procedure is sensitive to the error term distribution. If the underlying distribution is not both normal and homoskedastic, the Tobit procedure might be inconsistent. The next section introduces the logit regression which is intended to serve as a robustness check for Tobit.

4.4.2 Binomial logit regression model

Binomial logistic regression is a form of regression which is used when the dependent is a dichotomy and the independents are of any type. Thus, the dependant variable has only two outcomes, one or zero. In this thesis the dependant variable receives the value one if leasing is used and zero if not.

Logistic regression applies maximum likelihood estimation after transforming the dependent into a logit variable (the natural log of the odds of the dependent occurring or not). In this way, logistic regression estimates the probability of a certain event occurring. Logistic regression calculates changes in the log odds of the dependent, not changes in the dependent itself as OLS regression does. Therefore, the interpretation of the results is not as straight forward as it is for OLS regression.

The logistic model can be interpreted as the logarithm of the odds of success vs. failure. The logistic transformation of the success probability p is given by:

$$\text{logit}(p_i) = \log\left(\frac{p_i}{1 - p_i}\right) \qquad (1.12)$$

Using the generalized linear model framework (see Powers and Xie, 2000), the logit model can be obtained from equation 1.12:

$$\log(\frac{p_i}{1-p_i}) = \eta_i = \sum_{k=0}^{K} \beta_k x_{ik} \qquad (1.13)$$

The probability p_i is:

$$p_i = \frac{\exp(\sum_{k=0}^{K} \beta_k x_{ik})}{1+\exp(\sum_{k=0}^{K} \beta_k x_{ik})} = \Lambda(\eta_i) \qquad (1.14)$$

where $\Lambda(\eta_i)$ is a shorthand notation for the function:

$$\frac{\exp(\eta_i)}{1+\exp(\eta_i)} \qquad \textbf{(1.15)}$$

The logistic transformation ensures that regardless of x and β values, p remains between zero and one. The value p can denote the probability of success and its complement 1-p the probability of failure. Odds of success would be then $p/(1-p)$; for the logit transformation this would be recognized as the antilog of the logit, $\exp(\eta)$.

In short, interpretation of logit regression coefficient is often based on marginal effects. A marginal effect expresses the rate of change in one quantity relative to another. More specifically, the marginal effect is the change in the dependent variable per unit change in the independent variable. For continuous independent variables the marginal effect is:

$$\frac{\delta F(x_i'\beta)}{\delta x_{ik}} = \Lambda_i(1-\Lambda_i)\beta_k \qquad \textbf{(1.16)}$$

where $\Lambda_i = \Lambda(x_i'\beta)$.

5 Results

5.1 Descriptive analysis

Descriptive statistics from the sample are laid out in table 5. Few ratios could be highlighted. Naturally since the majority of the values for dependant variables are zero it is reflected in the statistics. Both types of leasing have a zero median and close to zero mean average. Striking is the maximum value for operating leasing. The sample includes at least one observation where a firm's total assets consists 99.9 per cent from operating leases. The accuracy of this observation is highly doubtful. The data gathered had errors and certain restrictions had to be imposed. For example, the range for operating and financial leasing was restricted to vary between zero and one. The maximum value for financial leasing seems plausible. Market to book ratio does have an extensive range, but considering the variety in the total sample no limits have been set.

As expected kurtosis and skewness values for operating and financial leasing variables show strong positive values. For both the distribution is anything but a symmetric normal distribution. Both distributions have a long right tail and the observations are extremely clustered. The market to book ratio does reflect the same tendency. The other variables do not either satisfy the normal distribution norms, but are not as asymmetric as the previous.

Table 5. Descriptive statistics of the variables in the study

This table shows descriptive statistics for the sample. The dependant variables are Financial leases to Assets and Operating leases to Assets. Before-financing marginal tax rate is obtained from applying the statutory federal tax schedule to contemporaneous taxable income, net of any net operating loss carryforwards. Leverage is defined as the ration of the book value of total long – term debt net of financial leases to total assets. Firm size is measured as logarithm of sales. O score is Ohlson's measure (1980) for bankruptcy varying from 0 to 1. Market to book ratio is market value divided by book value of the company. The sample consists of 66292 firm-year observations from 1999-2003, from 25 countries, and from following industries: construction, manufacturing, retail, service, transportation, and wholesale.

	Mean	Median	Std. Deviation	Minimum	Maximum	Skewness	Kurtosis
Operating Leasing	0.033	0.000	0.099	0.000	0.999	5.265	33.655
Financial Leasing	0.005	0.000	0.022	0.000	0.662	10.567	156.756
Tax rate	0.239	0.300	0.180	0.000	0.480	-0.395	-1.568
Leverage	0.113	0.061	0.138	0.000	0.994	1.541	2.473
Size	2.088	2.097	0.976	-4.092	5.409	-0.323	1.241
O-score	0.672	0.784	0.309	0.000	1.000	-0.793	-0.684
Market to Book ratio	3.555	1.622	9.964	0.002	298.676	14.934	303.766

Variable O-score shows quite high mean ratio. The interpretation of O-score is, the closer the ratio is to one the higher the bankruptcy probability. Table 6 below provides more detailed analysis of the sample structure. Approximately 50 percent of the firm-years have higher O-score ratio than 0.8. Such a high likelihood of bankruptcy for half of the sample could indicate that the Olhson's (1980) O-score is not a valid indicator for financial distress. The

fact has to be taken into account when reviewing the results. Table 6 also clearly portrays the effect of the core assumption applied in the thesis regarding the missing leasing data. Both leasing variables are heavily concentrated on zero value.

Table 6. Sample variables divided to deciles

The table divides the sample variables to deciles. The dependant variables are Financial leases to Assets and Operating leases to Assets. Before-financing marginal tax rate is obtained from applying the statutory federal tax schedule to contemporaneous taxable income, net of any net operating loss carryforwards. Leverage is defined as the ration of the book value of total long – term debt net of financial leases to total assets. Firm size is measured as logarithm of sales. O-score is Ohlson's measure (1980) for bankruptcy varying from 0 to 1. Market to book ratio is market value divided by book value of the company. The sample consists of 66292 firm-year observations from 1999-2003, from 25 countries, and from following industries: construction, manufacturing, retail, service, transportation, and wholesale.

Percentile	Operating Leasing	Financial Leasing	Tax rate	Leverage	Size	O-score	Market to Book
10	0.000	0.000	0.000	0.000	0.942	0.146	0.542
20	0.000	0.000	0.000	0.000	1.369	0.353	0.773
30	0.000	0.000	0.000	0.003	1.651	0.540	1.012
40	0.000	0.000	0.250	0.025	1.890	0.682	1.283
50	0.000	0.000	0.300	0.061	2.097	0.784	1.622
60	0.000	0.000	0.353	0.102	2.316	0.859	2.085
70	0.009	0.000	0.400	0.152	2.548	0.915	2.751
80	0.030	0.001	0.400	0.216	2.847	0.956	3.894
90	0.087	0.008	0.420	0.308	3.290	0.986	6.711

Before discussing the results, it seems logical to review the correlation matrix of the variables used in the regression analysis as a preliminary check of the model. It has to be kept in mind though, that table 7 coefficients are Pearson correlation coefficients which assume normally distributed variables. Especially the dependant variables did not satisfy this assumption. However, the correlation matrix still provides some initial evidence of the hypotheses and correlations among the independent variables.

Table 7. Pearson correlation coefficients for variables included in the study

Pearson correlation matrix of all the variables. The dependant variables are Financial leases to Assets and Operating leases to Assets. Before-financing marginal tax rate is obtained from applying the statutory federal tax schedule to contemporaneous taxable income, net of any net operating loss carryforwards. Leverage is defined as the ration of the book value of total long – term debt net of financial leases to total assets. Firm size is measured as logarithm of sales. O-score is Ohlson's measure (1980) for bankruptcy varying from 0 to 1. Market to book ratio is market value divided by book value of the company. The sample consists of 66292 firm-year observations from 1999-2003, from 25 countries, and from following industries: construction, manufacturing, retail, service, transportation, and wholesale.

	Tax rate	Leverage	Size	O-score	Market to Book
Operating Leasing	-0.038**	0.021**	0.105**	-0.015**	0.024**
Financial Leasing	-0.057**	0.009*	-0.023**	0.093**	0.016**
Tax rate	-	0.005	0.366**	-0.358**	-0.132**
Leverage		-	0.260**	0.352**	-0.027**
Size			-	-0.050**	-0.200**
O-score				-	0.081**
Market to Book ratio					-

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Comparing the results with the anticipated hypotheses some surprising differences do occur. First considering the correlations between operating leasing and the independent variables two sign differences appear. The variables size and O-score are showing opposite correlation than predicted in the hypotheses. It was assumed that larger firms would utilize operating leasing less than smaller firms (H5). The correlation, however, shows positive relation. Also financially distressed firms should use more operating leases (H8) and not less as the coefficient shows. Otherwise the hypotheses seem correct.

Hypotheses concerning financial leasing also appear to hold two false predictions. Correlation to tax rate is negative when positive relation was assumed (H2). The results seem also inconsistent with the leverage hypothesis (H4). Interestingly these two determinants of all determinants are most affected by country specific legislations. Could the contradiction be related to the use of international evidence? The results are discussed more in depth as the Tobit and logit regressions are performed.

Before reviewing the results the possible multicollinearity is checked. The interrelated independent variable correlations are also shown in table 7. The largest correlation is between tax rate and size. Similar correlations are also between O-score and tax rate and between O-score and leverage. However, it is not expected that multicollinearity will be a threat to the conclusions.

5.2 Determinants of leasing decision

The results for the total sample regressions of both financial instruments are presented in tables eight and thirteen. The outcome is disappointing. It was hoped that the results would shed light on the contradictions in hypotheses discussed. On the contrary, now the results confuse the situation even further and create a need for thorough study to examine the outcome of results. In this chapter the interest is focused on interpreting the five chosen determine variables: tax rate, leverage, size, O-score, and market to book ratio. First part discusses the determinants and hypotheses for operating leasing and after that the same is performed for financial leasing.

5.2.1 Determinants of operating leasing

Table 8 below sums up the determine variables relating to operating leasing.

Table 8. Coefficients for operating leasing

Table presents the operating leasing determinants. The dependant variable in Tobit regression is operating leases to total assets. For logit regression the dependant variable is one if operating leasing is used, and zero if not. Before-financing marginal tax rate is obtained from applying the statutory federal tax schedule to contemporaneous taxable income, net of any net operating loss carryforwards. Leverage is defined as the ration of book value of total long – term debt net of financial leases to total assets. Firm size is measured as logarithm of sales. O-score is Ohlson's measure (1980) for bankruptcy, varying from 0 to 1. Market to book ratio is market value divided by book value of the company. The sample consists of 66292 firm-year observations from 1999-2003, from 25 countries, and from following industries: construction, manufacturing, retail, service, transportation, and wholesale. The industry classification is the two digit SIC-code. Reference categories are Services, USA, and year 1999.

		TOBIT	**LOGIT**
	Exp. sign	Coefficient	Coefficient
Intercept		-0.145 ***	-2.337 ***
Leasing determinants			
Tax rate	-	-0.073 ***	-1.127 ***
Leverage	+	-0.055 ***	-0.037
Size	-	0.070 ***	1.136 ***
O-score	+	-0.018 ***	-0.481 ***
Market to Book	+	0.001 ***	0.009 ***
Industry dummies			
Construction		-0.086 ***	-0.789 ***
Manufacturing		-0.054 ***	-0.313 ***
Transportation		0.004	-0.348 ***
Wholesale		-0.049 ***	-0.550 ***
Retail		0.054 ***	-0.432 ***
Country dummies			
AUS		0.171 ***	3.706 ***
AUT		0.027 *	0.826 ***
BMU		0.110 ***	4.955 ***
CAN		0.067 ***	1.282 ***
CHE		0.023 ***	0.887 ***
CHN		-0.149 ***	-1.316 ***
DEU		0.042 ***	0.858 ***
DNK		0.006	0.769 ***
FIN		0.012	0.997 ***
FRA		-0.090 ***	-0.638 ***
GBR		0.078 ***	4.011 ***
HKG		0.103 ***	3.645 ***
IND		-0.098 ***	-0.740 ***
IRL		0.052 ***	2.843 ***
ITA		-0.084 ***	-0.482 ***
JPN		-0.186 ***	-1.688 ***
MYS		-0.061 ***	-0.067
NLD		0.068 ***	1.415 ***
NZL		0.104 ***	1.438 ***
SGP		0.144 ***	3.177 ***
SWE		-0.035 ***	-0.083
THA		-0.105 ***	-0.901 ***
TWN		-0.103 ***	-0.958 ***
ZAF		-0.009	-0.002
Year dummies			
2003		0.013 ***	0.114 ***
2002		0.016 ***	0.180 ***
2001		0.014 ***	0.146 ***
2000		0.003	0.003
Cox and Snell Pseudo R-square			0.366
Log likelihood		-4020.0	
Number of observations		66292	66292

***. Correlation is significant at the 0.001 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Unfortunately the results do not provide any clarification compared to the correlation matrix (table 7). Variables leverage, size, and O-score are showing opposite relations than predicted. Respectively hypotheses H3, H5, H8 are therefore incorrect. Only variables tax rate and market to book act as assumed. Tobit regression shows all coefficients to be statistically significant.

The results speak for the relation between operating leasing and leverage to be negative and not positive as assumed. What causes the weighting to operating leasing to decrease in asset structure as leverage increases? Or what does reason the effect of positive relation between operating leasing and size? Also how does operating leasing to total assets decrease as financial distress becomes more probable?

If leverage increase causes operating leasing to decrease the relation is substitute, instead of complementary relation (H3). It was hypothesised that financial leasing would have a substitute relation, but it is somewhat a surprise that also operating leases would act the same. The outcome is in line with the traditional financial trade-off theory. The financial trade-off theory of capital structure suggests that within a given capital structure debt and leasing are substitutes. The existing research has found evidence for both directions and the hypothesis was optimistically in accordance with the more recent findings of complementarity. In the light of table 8 results, the reasoning of Lewis and Schallheim (1993) that debt and leases can be complements because debt reduces the firm's effective marginal tax rate and, thus, creates an incentive for the firm to lease, could be challenged.

Hypotheses five, asset factor hypotheses, also turned out against assumed. The studies e.g. Barclay & Smith (1995) and Graham et al. (1998) that supported the original hypothesis of negative relation had used firm value as a size proxy. Whether the opposite relationship is due to the use of different proxy is at this point unclear. Still, my results speak for the fact that as firms' sales increase operating leasing becomes more dominating in the asset structure. It was mentioned in the theory section that size might not be the best estimate for asset factors, because size has also relevance for the financial contracting costs. Perhaps the outcome is influenced by financial contracting costs that overshadow the asset factor significance. The size hypothesis is further approached in chapter 5.5 and in the industry differences chapter 5.4.

The hypothesis for O-score (H8) is also disregarded. However, as it was mentioned in the descriptive statistics the reliability of O-score is questionable. The interpretation of the result is therefore difficult. To clarify the hypothesis further analysis is needed.

Nevertheless, hypotheses one and seven regarding tax- and financial contracting cost hypothesis appear to act as predicted. As the marginal tax rate declines the attractiveness of operating leasing does increase. As introduced in the theory chapter, operating leasing allows the use of tax benefits even if a firm has a zero marginal tax rate, something that is not applicable for debt financing. It that sense, the result is sensible and logical. The variable "market to book" is also consistent with expectations. The sign is positive and indicates that improving growth opportunities would tend to increase the probability of operating leasing. In fact, based on logit regression it can be estimated that the marginal effect of a percent increase in M/B would correspond to a 0.21 percent increase in the probability of observing operating leasing use, estimated at independent variables' mean.[1]

The predictive powers of the overall regressions are satisfactory, and it can be concluded that both regressions can be used for statistical analysis for the research problem. The logit regression's pseudo R^2 is 0.366 and for Tobit regression the log likelihood is 4020. As the emphasis is on the determinants and not as much on the model itself, the discussion of the accuracy and problems of pseudo R^2 is discarded.

All in all, before announcing the final verdict the robustness of the findings will be checked. The results left plenty to speculate and it is not clear whether table 8 provides an accurate reflection of the true picture.

5.2.1.1 Robustness of operating leasing determinants

To gain more detailed analysis I will focus to precise subsamples. I hope to exclude the distortions of the colourful data. First I check how monotonic the total sample is by dividing it to quintiles according to the tax variable. The first quintile represents the smallest 20 percent measured in tax rate. Table 9 lists all the determinants and coefficients for each quintile.

[1] The marginal effect of a continuous independent variable to the probability of dependent variable varies according to the distribution of the independent variable. Estimated at mean provides a reasonably fair approximation of the actual marginal effect.

Table 9. Operating leasing coefficient for quintiles of the total sample

Table presents the operating leasing determinants for the sample divided to quintiles according to tax variable. The dependant variable in Tobit regression is operating leases to total assets. For logit regression the dependant variable is one if operating leasing is used, and zero if not. Before-financing marginal tax rate is obtained from applying the statutory federal tax schedule to contemporaneous taxable income, net of any net operating loss carryforwards. Leverage is defined as the ration of book value of total long – term debt net of financial leases to total assets. Firm size is measured as logarithm of sales. O-score is Ohlson's measure (1980) for bankruptcy, varying from 0 to 1. Market to book ratio is market value divided by book value of the company. The total sample consists of 66292 firm-year observations from 1999-2003, from 25 countries, and from following industries: construction, manufacturing, retail, service, transportation, and wholesale. The industry classification is the two digit SIC-code. The dummy variables are not disclosed.

			TOBIT		Hypotheses check		LOGIT	
		Exp. sign		Coefficient			Coefficient	
1. quintile								
				too much multicollinearity among indenpent variables				
2. quintile								
	Intercept		***	0.197			-1.152	***
	Tax rate	-	***	0.156	V	V	3.301	***
	Leverage	+	***	-0.086	V	V	-0.619	***
	Size	-	***	0.066	V	V	0.675	***
	O-score	+	***	-0.043	V	V	-0.784	***
	Market to Book	+	**	0.000	%	%	0.001	
3. quintile								
	Intercept		***	-0.068			1.027	***
	Tax rate	-	***	-0.269	%	%	-10.213	***
	Leverage	+	***	0.017	%	%	0.772	***
	Size	-	***	0.049	V	V	0.872	***
	O-score	+	***	-0.001	V	V	-0.008	
	Market to Book	+	**	0.002	%	%	0.032	***
4. quintile								
	Intercept		***	-0.527			2.186	***
	Tax rate	-	***	0.594	V	%	-11.552	***
	Leverage	+		0.011	%	%	1.070	***
	Size	-	***	0.109	V	V	1.035	***
	O-score	+	***	-0.101	V	V	-1.212	***
	Market to Book	+		0.001	%	%	0.006	*
5. quintile								
	Intercept		***	-0.270			-6.371	***
	Tax rate	-	***	-0.231	%	V	2.316	*
	Leverage	+	***	0.192	%	%	2.445	***
	Size	-	***	0.086	V	V	1.528	***
	O-score	+	***	-0.069	V	V	-1.138	***
	Market to Book	+	***	0.006	%	%	0.068	***

***. Correlation is significant at the 0.001 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

The total sample holds a considerable number of negative income firm-years. As remarked in the variable description section, the marginal tax rate is set zero for negative income firm-years. As a consequence, the first quintile witnesses too much multicollinearity as all the firm-years have a zero tax rate. The same problem affects also the second quintile as over half of the firm-years contain zero tax values. Therefore, the second quintile outcome for tax rate would be significantly biased.

Otherwise, the results would suggest that perhaps it is possible that the leverage hypothesis H3 is actually correct. The second quintile still doesn't support the hypothesis, but when reviewing descriptive statistics for quintiles separately it can be pointed out that leverage statistics are roughly consistent for all quintiles (see appendix 1). In essence, the second quintile's results are speculative because of the amount of negative income firm-years.

The additional value of table 9 is to provide confirmation that tax hypothesis H1 and financial contracting cost hypothesis H7 are true and give hope that also leverage hypothesis H3 could be true. Positive is the consistence of size, financial distress, and financial contracting cost hypotheses. Based on table 9 results, it could be stated that size and financial distress hypoteses are opposite to expectations. Also it can be concluded, as expected, the sample is not fully monotonic.

As a second robustness check, I run the regression separately for USA and JAPAN to exclude the effect of international data. The results presented in table 10 are in line with results of table 9. The outcome is also consistent for both countries. Table 10 would also speak for the leverage hypothesis to be correct, although Tobit analysis would not support it for USA, but then again the variable is not statistically significant. The table also reports the first evidence of country factors and it seems, at least for USA and JAPAN, that no particular country factor exists between these two.

Table 10. Operating leasing coefficients for USA and Japan subsamples

Table presents the operating leasing determinants for the USA and Japan subsamples separately. The dependant variable in Tobit regression is operating leases to total assets. For logit regression the dependant variable is one if operating leasing is used, and zero if not. Before-financing marginal tax rate is obtained from applying the statutory federal tax schedule to contemporaneous taxable income, net of any net operating loss carryforwards. Leverage is defined as the ration of book value of total long – term debt net of financial leases to total assets. Firm size is measured as logarithm of sales. O-score is Ohlson's measure (1980) for bankruptcy, varying from 0 to 1. Market to book ratio is market value divided by book value of the company. The total sample consists of 66292 firm-year observations from 1999-2003, from 25 countries, and from following industries: construction, manufacturing, retail, service, transportation, and wholesale. The industry classification is the two digit SIC-code. The dummy variables are not disclosed.

			TOBIT				LOGIT	
		Exp. sign		Coefficient	Hypotheses check		Coefficient	
USA								
	Intercept		***	-0.206			-1.485	***
	Tax rate	-	***	-0.136	%	%	-1.158	***
	Leverage	+		-0.004	V	%	0.577	***
	Size	-	***	0.108	V	V	0.958	***
	O-score	+	***	-0.096	V	V	-0.976	***
	Market to Book	+	***	0.001	%	%	0.005	***
	Number of observations			19063			19063	
JPN								
	Intercept		***	-0.299			-8.611	***
	Tax rate	-	***	-0.025	%	%	-0.888	***
	Leverage	+	***	0.041	%	%	1.168	***
	Size	-	***	0.084	V	V	2.746	***
	O-score	+	***	-0.024	V	V	-1.022	***
	Market to Book	+	**	0.002	%	%	0.039	**
	Number of observations			14466			14466	

***. Correlation is significant at the 0.001 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

The third robustness check is to analyze the effect of the underlying assumption on the thesis. It was assumed that if leasing is not reported in the database it is not either used. Naturally the assumption is highly hypothetical and, therefore, a matter of interest. Table 11 presents the results for a regression where only firm-years with leasing are employed. The regression method is linear as the zero values do not create a problem. The linear regression serves also as a check for the Tobit regression's ability to process the concentration of zero values.

Table 11. Operating leasing regression coefficients for firm-years with leasing

Table presents the operating leasing determinants for a subsample where only firm-years with operating leasing are included. The dependant variable in linear regression is operating leases to total assets. Before-financing marginal tax rate is obtained from applying the statutory federal tax schedule to contemporaneous taxable income, net of any net operating loss carryforwards. Leverage is defined as the ration of book value of total long – term debt net of financial leases to total assets. Firm size is measured as logarithm of sales. O-score is Ohlson's measure (1980) for bankruptcy, varying from 0 to 1. Market to book ratio is market value divided by book value of the company. The total sample consists of 66292 firm-year observations from 1999-2003, from 25 countries, and from following industries: construction, manufacturing, retail, service, transportation, and wholesale. The industry classification is the two digit SIC-code. Reference categories are Services, USA, and year 1999. The dummy variables are not disclosed.

	Linear Regression			
	Exp. sign	Coefficient		Hypotheses check
Intercept		0.120	***	
Tax rate	-	-0.006		%
Leverage	+	-0.087	***	*V*
Size	-	0.007	***	*V*
O-score	+	0.027	***	%
Market to Book	+	0.001	***	%
Number of observations		25850		

***. Correlation is significant at the 0.001 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

The table 11 does strengthen the view that the tax rate hypothesis and financial contracting costs hypothesis are correctly specified, although the tax rate is not significant. As well, size hypothesis turns out incorrect once again. Surprisingly financial distress hypothesis appears correct for the first time. The descriptive statistics for O-score on the current sample selection do not indicate that the variable would be any more valid or reliable than in table 5 (see appendix 2). Therefore, the value of the finding is doubtful.

It is disappointing to find that the leverage hypothesis proves to be incorrect. When reviewing the descriptive statistics for leverage on both the table 11 subsample (firm-years with leasing) and the subsample (no leasing) that was excluded, it can be remarked that the descriptive figures are very similar, with the exception that the table 11 subsample has about two percent higher mean and median leverage ratios (see appendix 2). This would imply that the relation is positive as the hypothesis predicts; as leasing is used the leverage ratio will increase on average. As the table 11 indicates, however, among the firm-years where leasing exists the relation is still negative. Considering that the majority of values for operating leasing are zero in the total sample regressions, the difference compared to table 8 and 10 results could be explained partially on this "zero-value" factor.

The fourth and the final check extend the robustness check to an even more specific subsample. Table 12 is a continuum for the previous check. Now only US firm-years with leasing are included. All the other hypotheses except leverage hypothesis prove to be correct.

Table 12. Operating leasing regression coefficients for US firm-years with leasing

Table presents the operating leasing determinants for a subsample where only US firm-years with operating leasing are included. The dependant variable in linear regression is operating leases to total assets. Before-financing marginal tax rate is obtained from applying the statutory federal tax schedule to contemporaneous taxable income, net of any net operating loss carryforwards. Leverage is defined as the ration of book value of total long – term debt net of financial leases to total assets. Firm size is measured as logarithm of sales. O-score is Ohlson's measure (1980) for bankruptcy, varying from 0 to 1. Market to book ratio is market value divided by book value of the company. The total sample consists of 66292 firm-year observations from 1999-2003, from 25 countries, and from following industries: construction, manufacturing, retail, service, transportation, and wholesale. The industry classification is the two digit SIC-code. The dummy variables are not disclosed.

		Linear Regression		
	Exp. sign	Coefficient		Hypotheses check
Intercept		0.164	***	
Tax rate	-	-0.021		%
Leverage	+	-0.086	***	√
Size	-	-0.006	**	%
O-score	+	0.028	***	%
Market to Book	+	0.001	***	%
Number of observations		7419		

***. Correlation is significant at the 0.001 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

The tax hypothesis is correct but not significant. Leverage turns out opposite again. The size hypothesis is correct for the first time and significant. The last two hypotheses prove to be correct once again.

The summary of the results and further discussion is advanced in chapter 5.7.

5.2.2 Determinants of financial leasing

The results for financial leasing do not either offer an easy conclusion. Table 13 below summarises the results for the total sample. Three hypotheses appear to be false once again. Hypotheses for variables tax rate (H2), size (H5), and market to book (H7) contradict with the results. Only leverage hypothesis and financial distress hypothesis are as anticipated.

One difference compared to the results of operating leasing is the inferior statistical significance. Reasoning is simply the lower number of firm-years with leasing evidence.

Table 4 reported the proportion of observations with leasing to be 26.3 percent, whereas for operating leasing it was 39 percent. Perhaps because of this the significance of tax and financial contracting cost hypotheses are jeopardized. Overall, the explanatory value of the model is lower than it was for operating leasing, but still moderate.

Table 13 results indicate convincing statistical significance for leverage, size, and O-score. Tax rate and Market to Book coefficients are significant only for one regression and not for both. Therefore, in this section I will focus to the hypotheses that are significant at the 0.001 level and leave the two determinants to be discussed in the robustness part.

Leverage is as hypothesized. The relation is in line with the traditional financial trade-off theory of capital structure. Debt and financial leasing should be substitutes. The result is very logical as financial leasing is a fixed contractual obligation and, therefore, very similar financial instrument as debt.

Once again the size hypothesis (H5) can be rejected as the relation appears to be the opposite. As with operating leasing, the results are sound. The increase in sales would increase the probability of leasing use for both the instruments. Before jumping to any conclusions the robustness has to be checked.

Financial distress hypothesis turns out correct for financial leasing. As the distress becomes more overwhelming for the firm, the use of financial leasing in the asset structure becomes more dominant. Again, the validity of O-score is questionable and the result has to be viewed accordingly.

Table 13. Coefficients for financial leasing

Table presents the financial leasing determinants. The dependant variable in Tobit regression is financial leases to total assets. For logit regression the dependant variable is one if financial leasing is used, and zero if not. Before-financing marginal tax rate is obtained from applying the statutory federal tax schedule to contemporaneous taxable income, net of any net operating loss carryforwards. Leverage is defined as the ration of the book value of total long – term debt net of financial leases to total assets. Firm size is measured as logarithm of sales. O-score is Ohlson's measure (1980) for bankruptcy, varying from 0 to 1. Market to book ratio is market value divided by book value of the company. The sample consists of 66292 firm-year observations from 1999-2003, from 25 countries, and from following industries: construction, manufacturing, retail, service, transportation, and wholesale. The industry classification is the two digit SIC-code. Reference categories are Services, USA, and year 1999.

		TOBIT	**LOGIT**
	Exp. sign	Coefficient	Coefficient
Intercept		-0.057 ***	-2.027 ***
Leasing determinants			
Tax rate	+	-0.001	-0.206 **
Leverage	-	-0.021 ***	-0.335 ***
Size	-	0.005 ***	0.295 ***
O-score	+	0.034 ***	1.207 ***
Market to Book	+	-0,000 *	-0.002
Industry dummies			
Construction		-0.007 ***	-0.235 ***
Manufacturing		-0.002 **	-0.085 ***
Transportation		0.022 ***	0.221 ***
Wholesale		-0.008 ***	-0.331 ***
Retail		0.004 ***	0.051
Country dummies			
AUS		0.021 ***	1.067 ***
AUT		-0.017 ***	-0.834 ***
BMU		0.007	0.745 *
CAN		-0.003	0.065
CHE		-0.002	0.072
CHN		-0.071 ***	-3.495 ***
DEU		-0.027 ***	-1.216 ***
DNK		-0.026 ***	-1.150 ***
FIN		-0.065 ***	-2.847 ***
FRA		0.012 ***	0.295 ***
GBR		0.011 ***	0.821 ***
HKG		-0.001	0.290 ***
IND		-0.012 ***	-0.373 ***
IRL		0.015 ***	1.262 ***
ITA		-0.016 ***	-0.682 ***
JPN		-0.094 ***	-4.358 ***
MYS		0.016 ***	1.367 ***
NLD		-0.027 ***	-1.067 ***
NZL		-0.010 **	-0.282 *
SGP		0.019 ***	1.508 ***
SWE		-0.032 ***	-1.340 ***
THA		-0.008 ***	-0.199 **
TWN		-0.044 ***	-1.896 ***
ZAF		0.005 **	0.240 **
Year dummies			
2003		0.001	0.053
2002		0.001	0.066 *
2001		0.001	0.047
2000		0.000	0.054
Cox and Snell Pseudo R-square			0.233
Log likelihood		14538.2	
Number of observations		66292	66292

***. Correlation is significant at the 0.001 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

5.2.2.1 Robustness of financial leasing determinants

The robustness check is performed as it was completed for operating leasing. First the monotonicity of the total sample is checked. Table 14 displays the results. As for operating leasing, the first quintile does not provide any results due to multicollinearity. Again, the reason can be found from the number of zero tax results. The same cause hampers also the second quintile results.

Clearly the results of table 14 show that the total sample is not monotonic. Other than that, the explanatory power of the results for the original hypotheses is trivial. No real consistence appears between the quintiles. Also the significance of some coefficients is poor. The reasoning for the overall lack of significance and consistence is the same as affected the table 13 results. The number of witnessed leasing evidence is low. The kurtosis and skewness figures for financial leasing in every quintile show the distributions to be distinctly biased (see appendix 3). Therefore, table 14 does not provide any additional value to the conclusion.

Table 14. Financial leasing coefficient for quintiles of the total sample

Table presents the financial leasing determinants for the sample divided to quintiles according to tax variable. The dependant variable in Tobit regression is financial leases to total assets. For logit regression the dependant variable is one if financial leasing is used, and zero if not. Before-financing marginal tax rate is obtained from applying the statutory federal tax schedule to contemporaneous taxable income, net of any net operating loss carryforwards. Leverage is defined as the ration of book value of total long – term debt net of financial leases to total assets. Firm size is measured as logarithm of sales. O-score is Ohlson's measure (1980) for bankruptcy, varying from 0 to 1. Market to book ratio is market value divided by book value of the company. The total sample consists of 66292 firm-year observations from 1999-2003, from 25 countries, and from following industries: construction, manufacturing, retail, service, transportation, and wholesale. The industry classification is the two digit SIC-code. The dummy variables are not disclosed.

		TOBIT		Hypotheses check		LOGIT	
	Exp. sign		Coefficient			Coefficient	
1. quintile							
			too much multicollinearity among indenpent variables				
2. quintile							
Intercept		***	0.054			-1.607	***
Tax rate	+		-0.001	V	%	0.517	*
Leverage	-	**	-0.010	%	%	-0.178	
Size	-	***	0.003	V	V	0.139	***
O-score	+	***	0.035	%	%	1.002	***
Market to Book	+	*	0.000	%	V	-0.002	*
3. quintile							
Intercept		***	-0.046			2.245	***
Tax rate	+		0.003	%	V	-12.885	***
Leverage	-		-0.004	%	V	0.076	
Size	-	***	0.001	V	V	0.132	***
O-score	+	***	0.033	%	%	1.310	***
Market to Book	+	***	-0.001	V	V	-0.042	***
4. quintile							
Intercept		***	-0.090			1.465	**
Tax rate	+	***	0.074	%	V	-8.362	***
Leverage	-	***	-0.038	%	%	-0.149	
Size	-	***	0.003	V	V	0.235	***
O-score	+	***	0.044	%	%	0.823	***
Market to Book	+	**	-0.000	V	V	-0.009	*
5. quintile							
Intercept		***	-0.147			3.510	**
Tax rate	+	**	-0.009	V	V	-19.360	***
Leverage	-	***	0.083	V	V	2.970	***
Size	-	***	0.010	V	V	0.501	***
O-score	+	***	-0.009	V	V	-0.454	*
Market to Book	+	***	0.002	%	%	0.058	***

***. Correlation is significant at the 0.001 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Next the financial leasing determinants are studied with USA and Japan subsamples. Table 15 below summarises the results. Once again, the results for financial leasing are disappointing. The coefficients for USA and Japan do not indicate any consistence. Also the statistical significance of the results is poor. The lack of significance for Japan can be explained by the low number of observations of leasing use. The total sample of 14466 firm-years for Japan contains only 109 observations of actual leasing use.

Table 15. Financial leasing coefficients for USA and Japan subsamples

Table presents the financial leasing determinants for the USA and Japan subsamples separately. The dependant variable in Tobit regression is financial leases to total assets. For logit regression the dependant variable is one if financial leasing is used, and zero if not. Before-financing marginal tax rate is obtained from applying the statutory federal tax schedule to contemporaneous taxable income, net of any net operating loss carryforwards. Leverage is defined as the ration of book value of total long – term debt net of financial leases to total assets. Firm size is measured as logarithm of sales. O-score is Ohlson's measure (1980) for bankruptcy, varying from 0 to 1. Market to book ratio is market value divided by book value of the company. The total sample consists of 66292 firm-year observations from 1999-2003, from 25 countries, and from following industries: construction, manufacturing, retail, service, transportation, and wholesale. The industry classification is the two digit SIC-code. The dummy variables are not disclosed.

			TOBIT				LOGIT	
					Hypotheses check			
		Exp. sign		Coefficient			Coefficient	
USA								
	Intercept		***	-0.057			-1.406	***
	Tax rate	+		-0.004	V	V	-0.418	***
	Leverage	-	***	-0.021	%	%	-0.203	
	Size	-	***	0.003	V	V	0.170	***
	O-score	+	***	0.036	%	%	0.877	***
	Market to Book	+	**	-0.000	V	V	-0.003	**
	Number of observations			19063			19063	
JPN								
	Intercept		***	0.024			-10.715	***
	Tax rate	+	***	0.010	%	V	-1.176	
	Leverage	-	***	0.028	V	V	1.867	
	Size	-	***	-0.012	%	V	2.039	***
	O-score	+	***	0.024	%	V	-1.034	*
	Market to Book	+	***	0.007	%	%	0.035	
	Number of observations			14466			14466	

***. Correlation is significant at the 0.001 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

As for operating leasing the next in line is the regression with only clear evidence of financial leasing. Table 16 regression is completed with non-zero values of financial leasing. After the two previous tables, the table 16 presents significant and also supportive results. All five determinants are as expected.

Table 16. Financial leasing regression coefficients for firms with leasing

Table presents the financial leasing determinants for a subsample where only firm-years with financial leasing are included. The dependant variable in linear regression is financial leases to total assets. Before-financing marginal tax rate is obtained from applying the statutory federal tax schedule to contemporaneous taxable income, net of any net operating loss carryforwards. Leverage is defined as the ration of book value of total long – term debt net of financial leases to total assets. Firm size is measured as logarithm of sales. O-score is Ohlson's measure (1980) for bankruptcy, varying from 0 to 1. Market to book ratio is market value divided by book value of the company. The total sample consists of 66292 firm-year observations from 1999-2003, from 25 countries, and from following industries: construction, manufacturing, retail, service, transportation, and wholesale. The industry classification is the two digit SIC-code. Reference categories are Services, USA, and year 1999. The dummy variables are not disclosed.

		Linear Regression		
	Exp. sign	Coefficient		Hypotheses check
Intercept		0.012	***	
Tax rate	+	0.011	***	%
Leverage	-	-0.026	***	%
Size	-	-0.003	***	%
O-score	+	0.022	***	%
Market to Book	+	0.000	***	%
Number of observations		17393		

***. Correlation is significant at the 0.001 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Last the check is limited to include only US firm-years. Table 17 results provide more evidence for the reasoning that it is the lack of non-zero financial leasing observations that bias the results on the total sample regressions. As the bias is excluded the original hypotheses hold, expect for the financial contracting cost hypothesis. The market to book coefficient is very close to zero and the effect to financial leasing is therefore minor, and besides the coefficient is not statistically significant. The market to book coefficient on table 16 also showed very remote relation to financial leasing.

Table 17. Financial leasing regression coefficients for US firm-years with leasing

Table presents the financial leasing determinants for a subsample where only US firm-years with financial leasing are included. The dependant variable in linear regression is financial leases to total assets. Before-financing marginal tax rate is obtained from applying the statutory federal tax schedule to contemporaneous taxable income, net of any net operating loss carryforwards. Leverage is defined as the ration of book value of total long – term debt net of financial leases to total assets. Firm size is measured as logarithm of sales. O-score is Ohlson's measure (1980) for bankruptcy, varying from 0 to 1. Market to book ratio is market value divided by book value of the company. The total sample consists of 66292 firm-year observations from 1999-2003, from 25 countries, and from following industries: construction, manufacturing, retail, service, transportation, and wholesale. The industry classification is the two digit SIC-code. The dummy variables are not disclosed.

		Linear Regression		
	Exp. sign	Coefficient		Hypotheses check
Intercept		0.009	***	
Tax rate	+	0.014	***	%
Leverage	-	-0.029	***	%
Size	-	-0.004	***	%
O-score	+	0.027	***	%
Market to Book	+	-0.000		V
Number of observations		6355		

***. Correlation is significant at the 0.001 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Summary of the results and further discussion is advanced in chapter 5.7.

5.3 Country differences

One of the research problems was to study the differences of leasing use in different countries. Tables eight and thirteen have already reported the dummy coefficients for both leasing instruments. In this part I will try to provide more indepth analysis of the results.

One figure which differentiates the countries is the statutory tax rate. In general, as the operating leasing can be viewed as a true-lease, which allows the transfer of tax benefits, I will study whether the statutory tax rate has influence on the operating leasing. The result should be consistent with the findings of table 8 as the marginal tax rate is heavily influenced by statutory tax rate. The figure 2 below illustrates the results (for details of tax rates see appendix 4).

The graph visualizes the country deviances based on table 8 coefficients and posititions the values according to the difference of the statutory country tax rate compared to USA. The y-axis measured the country differences in operating leasing use compared to the reference country USA. The x-axis shows the statutory country tax rate difference to the reference. The graph also show the trendline for the sample. Tax rates are from year 2002

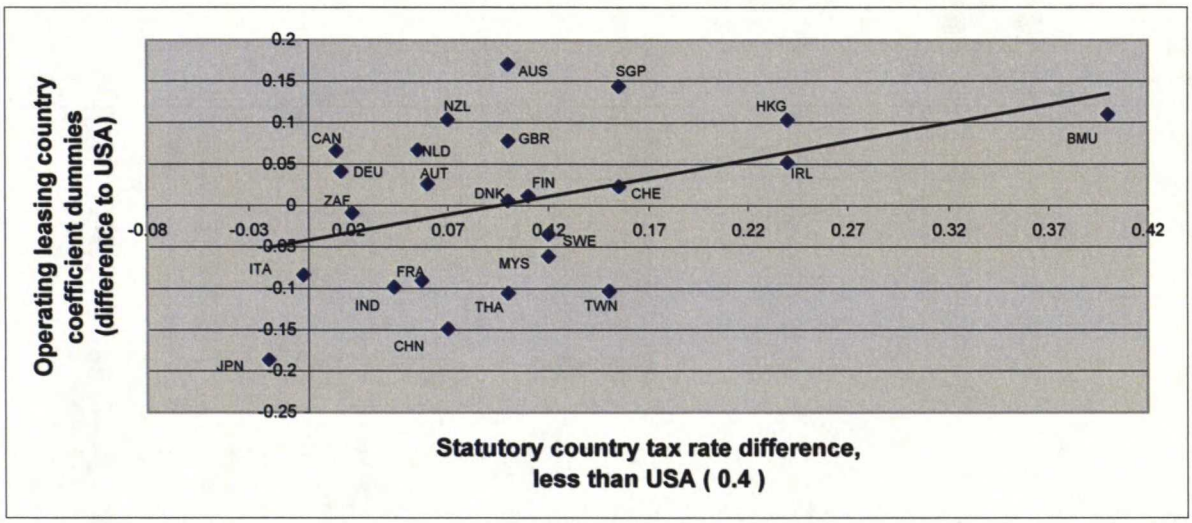

Figure 2. Operating leasing and statutory country tax rate relation

The graph does support the negative relation of tax rate and operating leasing, although now the correlation is to statutory tax rate. As the statutory tax rate declines the proportion of operating leasing in the asset structure becomes more dominant. The result is in accordance with the original hypothesis and supportive for the results presented in the operating leasing chapter 5.2.1.

The country dependence was briefly discussed in the robustness part for both instruments. I will extend the check to include six countries. The chosen countries are the six largest country subsamples measured in number of observations. I have excluded the smaller country subsamples to ensure statistical significance. Table 18 below presents the results in the form of relation signs. The purpose is to provide a quick check to see whether country factors exist.

Table 18. Relation check for six sample countries

Table presents a quick overview of country dependence in form of coefficient relations. Regressions are performed for each country and for operating leasing and financial leasing separately. The sign of relation is chosen from Tobit or logit regression, whichever provides better statistical significance. The dependant variable in regressions is either operating leases or financial leases to total assets. Before-financing marginal tax rate is obtained from applying the statutory federal tax schedule to contemporaneous taxable income, net of any net operating loss carryforwards. Leverage is defined as the ration of book value of total long – term debt net of financial leases to total assets. Firm size is measured as logarithm of sales. O-score is Ohlson's measure (1980) for bankruptcy, varying from 0 to 1. Market to book ratio is market value divided by book value of the company.

	Exp. sign	USA	JAPAN	GBR	CHN	FRA	DEU
Operating leasing							
Leasing determinants							
Tax rate	-	-	-	-	-	-	-
Leverage	+	+	+	-	(-)	(-)	(-)
Size	-	+	+	+	+	+	+
O-score	+	-	-	+	-	(+)	(-)
Market to Book	+	+	+	+	-	(+)	+
Number of observations of non-zero leasing use to total number of sample		38.9%	12.2%	93.7%	10.7%	23.1%	52.0%
Financial leasing							
Leasing determinants							
Tax rate	+	-		+		-	-
Leverage	-	-		-		-	(+)
Size	-	+		+		+	+
O-score	+	+		+		(+)	-
Market to Book	+	-		-		(-)	(-)
Number of observations of non-zero leasing use to total number of sample		33.4%	0.8%	53.8%	1.5%	42.3%	14.3%
Total number of observations		19063	14466	4246	2665	2643	2608

( ). Correlation is not significant at the 0.05 level (2-tailed).

The interest in interpretation is on the tax and leverage issues. For operating leasing the tax rate signs are as expected for all countries. For leverage variable, the GBR sign is different from USA and Japan. As well, China, France, and Germany show opposite signs, however, the coefficients are not statistically significant even at the 0.05 level. Why does Great Britain coefficient support negative relation? As the tax and accounting legislations between UK and USA do not differ considerably, the reasoning could be related to other factors. Interestingly, the GBR subsample holds a very high percentage of actual non-zero leasing observations, almost 100 percent. Compared to USA sample or especially to Japan the difference is remarkable. For comparison, table 12 provided results for a regression where only US firm-years with leasing were included. Then negative relation was found for leverage. It seems as

the number of zero operating leasing values gets closer to nil the relation for leverage does turn out to be negative. Once again, it is the "zero-value" -effect that might bias the results.

On the financial leasing side, the results are affected by the low number of non-zero financial leasing values. The signs for Japan and China are not presented as no statistical significance occurs. Now, the leverage values appear consistent. Tax rate variables are negative with the exception of Great Britain that differs from the other countries. I am inclined to believe that actually the positive value for the tax variable is closer to the truth in this case. The table 17 regression for US firm-years with leasing did also find positive relation for the tax variable, as the regression was performed with non-zero evidence.

Otherwise, noteworthy in the previous table is the consistent positive sign for the size determinant. Almost without exception the size determinant has shown positive direction for both instruments in all regressions.

5.4 Industry differences

Industry coefficients were presented already in tables eight and thirteen. To provide a more illustrative picture of the findings I have set the industry groups in order as seen in figure 2.

The theory part discussed the study of Krishnan and Moyer (1994) and the findings they had on the industry differences. The results were based on financial leasing and for the time period of 1984-1986. They concluded that the order of financial leasing propensity among industries was, starting from the highest leasing use: transportation, service, retail trade, mining, wholesale trade, manufacturing. My findings do not verify the exact order, but the evidence is similar.

The table lists the industry groups in order of table eight and thirteen results. The arrow indicates the increase in leasing use.

	Operating leasing	Financial leasing
Use of leasing increases ↑	**Service**	**Transportation**
	Manufacturing	**Retail**
	Transportation	**Service**
	Retail	**Manufacturing**
	Wholesale	**Construction**
	Construction	**Wholesale**

Figure 3. Industry groups in order of leasing propensity

Financial leasing is used most extensively on the transportation industry. The outcome is no surprise. Commonly e.g. aircrafts, ships, busses, are financed with financial leasing. Retail- and service sector does also find financial leasing attractive. This suggests that assets leased in these industries, such as aircrafts and retail space, are easily redeployable and, therefore, especially suitable for leasing. Less financing is utilized on the manufacturing, construction, and wholesale industries. Indicating that the largest and the most capital intensive assets are financed with alternative financing options. It would be reasonable to believe that these assets' characteristics are not convenient for financial leasing, i.e. if the asset has to be tailored for the firm. The finding does support the hypothesis six, the more specific asset characteristics the industry has, the less likely leasing is used.

The propensity to use operating leasing is somewhat similar as it is for financial leasing. The top four industry groups are the same. Operating leasing appears to be widely used on the service sector. Operating leasing is, in general, a cancellable and short-term lease contract. In the service industry the need for such contracts seems high. As the operating leasing is measured in percentage of total assets, if the level of assets is low (hence, firms operating in a low capital intensive sector), one relatively small operating leasing contract can have a material effect on the percentage value. The service sector holds a number of different types of firms and asset structures, but some of the firms e.g. consulting firms, can have a very low asset structure. Therefore, if i.e. the office equipments and all computers have been leased

using operating leasing, the variable would show high percentage. On the contrary, such small operating leasing contracts as computers do not have an effect on the capital intensive sectors.

Second highest user of operating leasing appears to be manufacturing sector and after that the transportation industry. The fourth is retail sector. It seems as the industries which use financial leasing also utilize operating leasing. For both instruments, the least to take advantage of either instrument are wholesale and construction sectors.

5.5 Size dependence

I am interested to know whether leasing is determined differently according to firm size. I have already presented evidence for both leasing instruments that as the size of the firm increases so does the leasing proportion in the asset structure. Now the focus is to study if the determinants are size dependent.

Table 18 reports the results for the regressions. I formed two subsamples, one for the smallest 20 percent, and one for the largest 20 percent. The sales of the smallest 20 percent firms range from almost zero up to 23 million USD. For the largest 20 percent the range of sales is between 0.7-253 billion USD. The table has a column for cross check. Its function is to check whether there is size dependence between the subsample determinants.

Table 19. Leasing coefficients for subsamples of the smallest and largest 20 percent

Table presents operating leasing and financial leasing determinants for the subsamples of smallest and largest 20 percent. The size is measured in sales. The dependant variable in Tobit regression is either operating leases or financial leases to total assets. For logit regression the dependant variable is one if operating leasing is used, and zero if not; same is applicable for financial leasing. Before-financing marginal tax rate is obtained from applying the statutory federal tax schedule to contemporaneous taxable income, net of any net operating loss carryforwards. Leverage is defined as the ration of book value of total long – term debt net of financial leases to total assets. Firm size is measured as logarithm of sales. O-score is Ohlson's measure (1980) for bankruptcy, varying from 0 to 1. Market to book ratio is market value divided by book value of the company. The total sample consists of 66292 firm-year observations from years 1999-2003, and from following industries: construction, manufacturing, retail, service, transportation, and wholesale. The industry classification is the two digit SIC-code. The dummy variables are not included. The middle column cross check compares the differences of the two subsamples.

		SMALLEST 20%			LARGEST 20%	
		TOBIT	LOGIT		TOBIT	LOGIT
	Exp. sign	Coefficient	Coefficient	Cross check	Coefficient	Coefficient
Operating leasing						
Intercept		-0.101 ***	-0.596 ***		0.056 ***	0.617 ***
Leasing determinants						
Tax rate	-	-0.176 ***	-2.081 ***	%	-0.114 ***	-1.303 ***
Leverage	+	-0.088 ***	-1.221 ***	V	0.123 ***	1.949 ***
Size	-	0.025 ***	0.185 ***	%	0.013 ***	0.271 ***
O-score	+	0.012 ***	-0.063	V	-0.088 ***	-0.989 ***
Market to Book	+	-0.000 ***	-0.013 ***	V	0.002 ***	0.020 ***
Financial leasing						
Intercept		-0.073 ***	-1.782 ***		-0.077 ***	-2.827 ***
Leasing determinants						
Tax rate	+	-0.012 **	-0.779 ***	%	-0.035 **	-1.401 ***
Leverage	-	-0.007	0.177		-0.006 *	0.620 ***
Size	-	0.015 ***	0.506 ***	%	0.015 ***	0.708 ***
O-score	+	0.036 ***	0.837 ***	%	0.010 ***	-0.084
Market to Book	+	-0.000	-0.003 **		0.000	0.005
Number of observations		13247	13247		13247	13247

***. Correlation is significant at the 0.001 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

It seems as the determinants for financial leasing are not much different according to size. The relations are the same for both subgroups. The leverage and market to book coefficient are not statistically significant and, therefore, no real interpretation is possible based on my findings. However, Lasfer and Levis (1998) have found similar findings for leverage that could be also applicable for my result. They conclude that for large firms financial leasing is a complement to debt financing. Also their results suggest that leasing allows small firms to finance their growth and/or survival, while for large firms leasing appears to be a financial instrument used by sophisticated financial managers to minimize their after-tax cost of capital.

The financial leasing hypotheses reflect the same outcome as the table 13 reported. The only difference is the market to book coefficient, but unfortunately it is not statistically significant.

So, table 19 does not provide any additional clarification to the discussion of the original financial leasing hypotheses.

The clear differences appear for operating leasing. Only determinants tax rate and size are similar for both groups as the cross check column indicates. Also the relations of the two determinants are as they appear in the table 8 and confirm the robustness of table 8 regression results.

The firm size dependence is witnessed for leverage, O-score, and market to book. The findings would suggest that for smaller firms operating leasing offsets the use of debt, and for larger firms the relation is complementary. Perhaps for smaller firms with very limited assets, the financing decisions are exclusionary, whereas, for larger firms with diverse asset structure, financing alternatives can be combinations of several options. On the other hand, the descriptive statistics show that the fraction of firm-years with leasing on the subsample is evidently less for smaller firms (about 20 %) than for larger firms (about 60 %). The bias of the effect is unclear. Still, if the results would hold, the indication would be that small firms do not make use of operating leasing to the same extent than larger firms. However, perhaps a more realistic implication is the inferior quality of data for small firms. The quality of financial statement information is better for large firms and also the Thomson database holds more data of the large firms.

Financial distress determinant also deviates according to firm size. As the original hypothesis predicts, a firm facing difficult times is like to rely on operating leasing. This turns out to be true for smaller firms. The result is logical, a small firm might not have a pool of alternatives on their hands, and operating leasing could be the only option. A large firm even in a financial distress still holds more options to choose from and, therefore, negative relation would be possible.

The final difference appears for financial contracting costs. The results would speak for the original hypothesis to be true for large firms. What would explain large firms to be more aware of the underinvestment problems (potential positive NPV are not taken as the benefits would accrue to bondholders), especially when small firms have higher market to book -ratios (see appendix 5)? A reasoning, that can not be addressed in detailed here, could be the

difference in asset types leased. Small firms lease different types of asset than large firms and their effect on the total asset structure is different.

5.6 Use of leasing over the sample years

The data sample supports the statistics discussed in the opening words of the thesis. According to Leaseurope statistics the use of leasing has increased over the last years in Europe. Table 8 dummy variables for years 1999-2003 indicate that the trend could be also international. The reference year is set to be 1999 and all the coefficients for the remaining years show positive values. From year 1999 the use of leasing has increased steadily to the turning point of year 2002. It seems as the slump of the economy in many countries after the technology bubble has affected also leasing usage. The peak 2002 was followed by a year of moderate decline.

Unfortunately, the year dummies on the financial leasing regression do not provide any statistically significant results.

5.7 Summary of determinant results

The chapter five has presented results from several different aspects. It has become apparent that the results lack consistence. In this chapter I will present the results of chapter 5.2 in form of hypotheses check. The figure 3 below illustrates the difficulty of reaching a conclusion. The figure only includes the results which had statistical significance and had explanatory value.

Table collects the findings of chapter 5.2. in form of hypotheses check. The results included here are in line with the discussion of quality of the respective table results . If results of a certain table has had minor explanatory value, they have been discarded to avoid further confusion.
The dependant variable is either operating leases or financial leases to total assets. Before-financing marginal tax rate is obtained from applying the statutory federal tax schedule to contemporaneous taxable income, net of any net operating loss carryforwards. Leverage is defined as the ration of book value of total long – term debt net of financial leases to total assets. Firm size is measured as logarithm of sales. O-score is Ohlson's measure (1980) for bankruptcy, varying from 0 to 1. Market to book ratio is market value divided by book value of the company.
Green colour indicates that the respective hypothesis appears correct. Red colour indicates that the respective hypothesis has to be rejected.

Operating leasing

Exp. sign		Table 8	Table 9, 3. quintile	Table 9, 4. quintile	Table 9, 5. quintile	Table 10, USA	Table 10, JAPAN	Table 11	Table 12	Conclusion of hypotheses
-	Tax rate (H1)	%	%	%	%	%	%	%	%	%
+	Leverage (H3)	v	%	%	%	%	%	v	v	?
-	Size (H5)	v	v	v	v	v	v	v	%	v
+	O-score (H8)	v	v	v	v	v	v	%	%	?
+	Market to Book (H7)	%	%	%	%	%	%	%	%	%

Financial leasing

Exp. Sign		Table 13	Table 15, USA	Table 16	Table 17	Conclusion of hypotheses
+	Tax rate (H2)	v	v	%	%	?
-	Leverage (H4)	%	%	%	%	%
-	Size (H5)	v	v	%	%	?
+	O-score (H8)	v	%	%	%	%
+	Market to Book (H7)	%	v	%	?	?

Figure 4. Summary of the hypotheses' results

The results for operating leasing are easier to interpret as the sample data included more non-zero dependant variables than the financial leasing subsample. The operating leasing results provide two clear interpretations: tax rate hypothesis and market to book hypothesis are correct. As the marginal tax rate declines the use of operating leasing increases. Also as the growth opportunities increase the operating leasing proportion of total assets increases. I am also inclined to reject my size hypothesis (H5) for operating leasing. Only table 12 results would not suggest the decision. It was assumed that as firm size increases the operating leasing would be used less, because a larger firm could potentially get some of the benefits of leasing internally for purchased assets. Evidence does not support such interpretation, the contrary appears correct. The results for leverage and O-score hypotheses are mixed. I can not find support to accept nor to reject the hypotheses.

The interpretation for financial leasing hypotheses has to be confined to four sets of results. Only one clear conclusion is available. Leverage hypothesis (H4) is correct. Financial leasing does appear to be substitute for debt. Otherwise, the results are confusing. Still, I do highlight the financial distress hypothesis (H8) that would appear to be correct (the interpretation is debatable because of the validity of O-score). Only the first regression performed with the total sample indicates to reject the hypothesis. All the other, more focused data samples

support the original hypothesis. For the remaining three hypotheses I do not find clear evidence to support nor to reject the hypotheses.

Common for all regressions was the tendency to get more precise results as the data sample was focused. It became clear that the extensive percentage of zero dependent values affected the results. As the underlying assumption for the entire thesis was excluded, the hypotheses appeared to be close to hypothesized. However, as the underlying assumption is not without a logical explanation, I cannot reject the possibility that such an extensive number of firms do not use leasing.

6 Conclusion and suggestions for further research

The thesis has studied the determinants of leasing decision with an international scope. The aim was to find corporate factors that could determine whether and when a firm finds leasing financing attractive. More specifically, the research problem was divided in three: what determinants explain the use of leasing, how does the leasing use differentiate between countries, and does the industry category have an influence? The determinants were studied for operating leasing and financial leasing respectively.

The theory section introduced various determinants that have an effect on leasing decision. Also the chapter presented previous results on the subject. The determinants chosen were based on theory and existing research. The empirical analysis of the determinants was based on regression analysis. The nature of the data sample required the use of Tobit- and logit regressions. The results were to provide answers for the following hypotheses: tax differential hypothesis, debt substitutability hypothesis, asset factor hypothesis, financial contracting cost hypothesis, and financial distress hypothesis.

The theory section discussed the controversy of the findings of previous studies. The thesis results confirm the possibility of diverse results depending on the sample characteristics. The interpretation of thesis results is difficult due to lack of consistency. Nonetheless, for some of the hypotheses it was possible to find evidence to support or to reject the hypothesis.

Chapter 5.7 summarized the results for the determinants of operating leasing. It can be concluded that the tax hypothesis and the financial contracting cost hypothesis appear correct. Also the empirical data suggests rejecting the size hypothesis. For debt and financial distress hypotheses no clear conclusion can be reached. The results are divaricated, although statistically significant.

The tax findings indicate that as marginal tax rate declines the proportion of leasing on the asset structure increases. The attractiveness of operating leasing increases as the instrument enables the transfer of deprecation and interest tax shields from the lessor to the lessee in form of lower lease payments. The potential exists when the lessor and the lessee face different effective marginal tax rate, so that the lessor has the higher tax rate.

Financial contracting cost hypothesis appeared correct for operating leasing. As the ratio of market value to book value increases the use of operating leasing becomes more dominant. The theory chapter introduced the possibility that such behaviour is to avoid underinvestment problem. Myers (1977) argued that shareholders of a firm with risky claims in its capital structure would potentially forgo positive NPV investment if project benefits accrue to the firm's existing bondholders. Therefore, firms with high growth opportunities should use less debt instruments, and operating leasing provides an alternative.

Contrary to my expectations, the size hypothesis suggested the opposite direction. It was assumed that the larger the firm, the better the ability to find alternative functions for the asset and to rotate the asset within the firm. Also more likely the firm can find an economically efficient way to dispose the asset. However, the evidence distinctly supports operating leasing use to increase as the size of the firm increases.

The financial leasing hypotheses were summarized also in chapter 5.7. The results supported only two of the original hypotheses. Debt substitutability and financial distress hypotheses were consistent to expectations. For the remaining three hypotheses no clear interpretation was possible.

The empirical result of debt substitutability does strengthen the view that financial leasing is a debt like financial instrument. The finding supports the trade-off theory of capital structure. Financial distress hypothesis also turned out correct. For a distressed firm financial leasing appears to be an attractive alternative. The advantage of financial leasing over debt is the different treatment of instruments in case of bankruptcy. Lease financing has lower associated bankruptcy costs to the lessor than debt has to the lender. Therefore, occasionally financial leasing could be the only true option of financing for a distress firm.

The international scope of the thesis required to study the differences in leasing use between countries. The study was restricted to six largest countries measured in sample size. No distinct differences were found among the countries on tax and leverage issues.

The analysis of industry preferences on leasing turned out similar to the results of previous studies. The results supported the assumption that as the asset characteristics are specified for a firm financial leasing is used less. Financial leasing is used the most on transportation

industry. The operating leasing financial characteristics are significantly different compared to financial leasing. Therefore, the instrument is applied differently across industries. Service industry did appear to find operating leasing the most suitable of all industries. The least operating leasing was used on construction sector.

Finally, suggestion for further study would be to reanalyze the determinants after the accounting standards are revised. Most likely the disclosure requirements of leasing are improved. Likely, the quality of data available would also then get better. Second, the focus could be narrowed and the selection could be given more attention. If the leasing contracts could be associated with the assets, the study could be conducted on a whole different level.

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The Internal Revenue Service (IRS)
Leaseurope: http:/www.leaseurope.org
KPMG's Corporate Tax Rate Surveys 2000-2004

APPENDIX 1, descriptive statistics for operating leasing quintiles (table 9):

1.quintile Descriptive Statistics

	Minimum	Maximum	Mean		Std. Deviatior	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
OpLeas	0,0000	0,9988	0,0341	0,0008	0,0930	0,0090	5,0150	0,0210	31,3990	0,0430
FiLeas	0,0000	0,4320	0,0050	0,0002	0,0213	0,0000	9,2350	0,0210	116,5360	0,0430
OpLeNum	0,0000	1,0000	0,4500	0,0040	0,4970	0,2470	0,2100	0,0210	-1,9560	0,0430
FiLeNum	0,0000	1,0000	0,2900	0,0040	0,4550	0,2070	0,9170	0,0210	-1,1590	0,0430
Tax	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	.	.	.	.
Lev	0,0000	0,9829	0,1158	0,0013	0,1464	0,0210	1,6400	0,0210	2,8220	0,0430
Size	-4,0915	5,1339	1,7074	0,0087	1,0059	1,0120	-0,4140	0,0210	1,1110	0,0430
Oscore	0,0000	1,0000	0,8734	0,0016	0,1881	0,0350	-2,3110	0,0210	5,4120	0,0430
MB	0,0026	29,7844	3,0462	0,0359	4,1287	17,0460	3,0490	0,0210	11,0590	0,0430
Valid N (listwis	13257,0000									

2.quintile Descriptive Statistics

	Minimum	Maximum	Mean		Std. Deviatior	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
OpLeas	0,0000	1,0000	0,0400	0,0010	0,1070	0,0110	4,4120	0,0210	24,2820	0,0430
FiLeas	0,0000	0,6621	0,0064	0,0002	0,0275	0,0010	9,6810	0,0210	131,1230	0,0430
OpLeNum	0,0000	1,0000	0,4200	0,0040	0,4940	0,2440	0,3170	0,0210	-1,9000	0,0430
FiLeNum	0,0000	1,0000	0,3500	0,0040	0,4750	0,2260	0,6520	0,0210	-1,5750	0,0430
Tax	0,0000	0,2500	0,0675	0,0009	0,0997	0,0099	0,9205	0,0213	-0,9546	0,0425
Lev	0,0000	0,9943	0,1070	0,0013	0,1501	0,0230	1,6940	0,0210	2,7320	0,0430
Size	-3,7670	5,2522	1,7113	0,0095	1,0891	1,1860	-0,3620	0,0210	0,9400	0,0430
Oscore	0,0000	1,0000	0,7130	0,0027	0,3099	0,0960	-0,9360	0,0210	-0,4290	0,0430
MB	0,0100	298,6765	6,8938	0,1735	19,9727	398,9070	8,1120	0,0210	81,8430	0,0430
Valid N (listwis	13258,0000									

3.quintile Descriptive Statistics

	Minimum	Maximum	Mean		Std. Deviatior	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
OpLeas	0,0000	0,9944	0,0303	0,0007	0,0855	0,0070	5,7530	0,0210	41,9870	0,0430
FiLeas	0,0000	0,4420	0,0048	0,0002	0,0205	0,0000	10,0900	0,0210	140,2110	0,0430
OpLeNum	0,0000	1,0000	0,4756	0,0043	0,4994	0,2490	0,0980	0,0210	-1,9910	0,0430
FiLeNum	0,0000	1,0000	0,3307	0,0041	0,4705	0,2210	0,7200	0,0210	-1,4820	0,0430
Tax	0,2500	0,3530	0,3056	0,0002	0,0271	0,0010	-0,0950	0,0210	-0,7420	0,0430
Lev	0,0000	0,7804	0,1036	0,0011	0,1249	0,0160	1,5280	0,0210	2,5100	0,0430
Size	-2,1648	5,4032	2,1047	0,0070	0,8039	0,6460	0,4630	0,0210	0,5610	0,0430
Oscore	0,0000	1,0000	0,5866	0,0026	0,2959	0,0880	-0,5040	0,0210	-1,0310	0,0430
MB	0,0022	29,9357	2,7310	0,0265	3,0539	9,3260	3,7350	0,0210	19,2330	0,0430
Valid N (listwis	13258,0000									

4.quintile Descriptive Statistics

	Minimum	Maximum	Mean		Std. Deviatior	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
OpLeas	0,0000	0,9991	0,0523	0,0012	0,1347	0,0180	4,1580	0,0210	19,3330	0,0430
FiLeas	0,0000	0,5021	0,0063	0,0002	0,0254	0,0010	8,7040	0,0210	101,8290	0,0430
OpLeNum	0,0000	1,0000	0,4369	0,0043	0,4960	0,2460	0,2540	0,0210	-1,9360	0,0430
FiLeNum	0,0000	1,0000	0,3104	0,0040	0,4627	0,2140	0,8200	0,0210	-1,3280	0,0430
Tax	0,3530	0,4000	0,3904	0,0001	0,0149	0,0000	-1,3110	0,0210	0,2880	0,0430
Lev	0,0000	0,9120	0,1378	0,0013	0,1473	0,0220	1,1390	0,0210	0,9420	0,0430
Size	-2,7445	5,4088	2,4279	0,0081	0,9307	0,8660	0,0310	0,0210	0,2580	0,0430
Oscore	0,0000	1,0000	0,5465	0,0028	0,3215	0,1030	-0,3460	0,0210	-1,2970	0,0430
MB	0,0147	221,9101	3,3253	0,0599	6,8949	47,5400	14,3440	0,0210	310,8130	0,0430
Valid N (listwis	13258,0000									

5.quintile Descriptive Statistics

	Minimum	Maximum	Mean		Std. Deviatior	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
OpLeas	0,0000	0,9476	0,0078	0,0004	0,0467	0,0020	10,7380	0,0210	143,7040	0,0430
FiLeas	0,0000	0,1871	0,0005	0,0000	0,0054	0,0000	18,4740	0,0210	449,7590	0,0430
OpLeNum	0,0000	1,0000	0,1693	0,0033	0,3750	0,1410	1,7640	0,0210	1,1120	0,0430
FiLeNum	0,0000	1,0000	0,0370	0,0016	0,1888	0,0360	4,9040	0,0210	22,0550	0,0430
Tax	0,4000	0,4800	0,4300	0,0002	0,0222	0,0000	1,6160	0,0210	1,0460	0,0430
Lev	0,0000	0,7989	0,1002	0,0010	0,1132	0,0130	1,4990	0,0210	2,6120	0,0430
Size	-0,4384	5,2207	2,4906	0,0060	0,6955	0,4840	0,3810	0,0210	0,7640	0,0430
Oscore	0,0000	1,0000	0,6426	0,0026	0,2999	0,0900	-0,6830	0,0210	-0,8640	0,0430
MB	0,0391	126,0917	1,7785	0,0251	2,8952	8,3820	13,8160	0,0210	411,4770	0,0430

APPENDIX 2, descriptive statistics (table 11) :

Descriptive Statistics for table 11 subsample

	Range	Minimum	Maximum	Mean		Std. Deviat	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
OpLeas	0.9991	0.0000	0.9991	0.0852	0.0009	0.1434	0.0210	3.2890	0.0150	12.5300	0.0300
Tax	0.5000	0.0000	0.5000	0.2210	0.0011	0.1693	0.0290	-0.3000	0.0150	-1.5610	0.0300
Lev	0.9943	0.0000	0.9943	0.1229	0.0009	0.1430	0.0200	1.3260	0.0150	1.5840	0.0300
Size	8.4668	-3.0580	5.4088	2.3239	0.0063	1.0087	1.0180	-0.3490	0.0150	0.5770	0.0300
Oscore	1.0000	0.0000	1.0000	0.6562	0.0019	0.3074	0.0940	-0.7340	0.0150	-0.7430	0.0300
MB	280.3164	0.0100	280.3264	3.3837	0.0425	6.8332	46.6930	17.8230	0.0150	535.0510	0.0300
Valid N	25850										

Percentiles	OpLeas	Tax	Lev	Size	Oscore	MB
10	0.0025	0.0000	0.0000	1.0729	0.1357	0.6988
20	0.0073	0.0000	0.0000	1.5190	0.3386	0.9801
30	0.0134	0.0000	0.0031	1.8454	0.5216	1.2365
40	0.0214	0.2200	0.0294	2.1022	0.6558	1.5149
50	0.0319	0.2900	0.0720	2.3539	0.7562	1.8757
60	0.0480	0.3000	0.1206	2.6009	0.8321	2.3261
70	0.0715	0.3600	0.1753	2.8722	0.8937	2.9905
80	0.1153	0.4000	0.2381	3.1735	0.9433	4.1349
90	0.2239	0.4000	0.3294	3.5805	0.9825	6.7898

Descriptive Statistics for the subsample that was excluded from table 11

	Range	Minimum	Maximum	Mean		Std. Deviat	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
OpLeas	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	.	.	.	.
Tax	0.0000	0.0000	0.0000	0.2500	0.0010	0.1850	0.0340	-0.4750	0.0120	-1.5530	0.0240
Lev	0.9829	0.0000	0.9829	0.1065	0.0007	0.1340	0.0180	1.6970	0.0120	3.2160	0.0240
Size	9.4581	-4.0915	5.3666	1.9379	0.0046	0.9228	0.8520	-0.4360	0.0120	1.9710	0.0240
Oscore	1.0000	0.0000	1.0000	0.6828	0.0015	0.3101	0.0960	-0.8340	0.0120	-0.6350	0.0240
MB	298.6743	0.0022	298.6765	3.6643	0.0573	11.5274	132.8820	13.4200	0.0120	234.9410	0.0240
Valid N	40442										

Percentiles	OpLeas	Tax	Lev	Size	Oscore	MB
10	0.0000	0.0000	0.0000	0.8656	0.1510	0.4834
20	0.0000	0.0000	0.0000	1.2897	0.3617	0.6820
30	0.0000	0.0000	0.0030	1.5635	0.5530	0.8830
40	0.0000	0.2800	0.0237	1.7827	0.7014	1.1283
50	0.0000	0.3300	0.0551	1.9758	0.8021	1.4498
60	0.0000	0.3900	0.0931	2.1667	0.8750	1.9017
70	0.0000	0.4000	0.1390	2.3679	0.9259	2.5844
80	0.0000	0.4200	0.1997	2.6098	0.9627	3.7180
90	0.0000	0.4200	0.2930	2.9924	0.9877	6.6529

APPENDIX 3, descriptive statistics for quintiles (table 14):

2.quintile Descriptive Statistics

	Minimum	Maximum	Mean		Std. Deviat	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
OpLeas	0.0000	1.0000	0.0400	0.0010	0.1070	0.0110	4.4120	0.0210	24.2820	0.0430
FiLeas	0.0000	0.6621	0.0064	0.0002	0.0275	0.0010	9.6810	0.0210	131.1230	0.0430
OpLeNum	0.0000	1.0000	0.4200	0.0040	0.4940	0.2440	0.3170	0.0210	-1.9000	0.0430
FiLeNum	0.0000	1.0000	0.3500	0.0040	0.4750	0.2260	0.6520	0.0210	-1.5750	0.0430
Tax	0.0000	0.2500	0.0675	0.0009	0.0997	0.0099	0.9205	0.0213	-0.9546	0.0425
Lev	0.0000	0.9943	0.1070	0.0013	0.1501	0.0230	1.6940	0.0210	2.7320	0.0430
Size	-3.7670	5.2522	1.7113	0.0095	1.0891	1.1860	-0.3620	0.0210	0.9400	0.0430
Oscore	0.0000	1.0000	0.7130	0.0027	0.3099	0.0960	-0.9360	0.0210	-0.4290	0.0430
MB	0.0100	298.6765	6.8938	0.1735	19.9727	398.9070	8.1120	0.0210	81.8430	0.0430
Valid N (lis	13258									

3.quintile

Descriptive Statistics

	Minimum	Maximum	Mean		Std. Deviat	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
OpLeas	0.0000	0.9944	0.0303	0.0007	0.0855	0.0070	5.7530	0.0210	41.9870	0.0430
FiLeas	0.0000	0.4420	0.0048	0.0002	0.0205	0.0000	10.0900	0.0210	140.2110	0.0430
OpLeNum	0.0000	1.0000	0.4756	0.0043	0.4994	0.2490	0.0980	0.0210	-1.9910	0.0430
FiLeNum	0.0000	1.0000	0.3307	0.0041	0.4705	0.2210	0.7200	0.0210	-1.4820	0.0430
Tax	0.2500	0.3530	0.3056	0.0002	0.0271	0.0010	-0.0950	0.0210	-0.7420	0.0430
Lev	0.0000	0.7804	0.1036	0.0011	0.1249	0.0160	1.5280	0.0210	2.5100	0.0430
Size	-2.1648	5.4032	2.1047	0.0070	0.8039	0.6460	0.4630	0.0210	0.5610	0.0430
Oscore	0.0000	1.0000	0.5866	0.0026	0.2959	0.0880	-0.5040	0.0210	-1.0310	0.0430
MB	0.0022	29.9357	2.7310	0.0265	3.0539	9.3260	3.7350	0.0210	19.2330	0.0430
Valid N (lis	13258									

4.quintile Descriptive Statistics

	Minimum	Maximum	Mean		Std. Deviat	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
OpLeas	0.0000	0.9991	0.0523	0.0012	0.1347	0.0180	4.1580	0.0210	19.3330	0.0430
FiLeas	0.0000	0.5021	0.0063	0.0002	0.0254	0.0010	8.7040	0.0210	101.8290	0.0430
OpLeNum	0.0000	1.0000	0.4369	0.0043	0.4960	0.2460	0.2540	0.0210	-1.9360	0.0430
FiLeNum	0.0000	1.0000	0.3104	0.0040	0.4627	0.2140	0.8200	0.0210	-1.3280	0.0430
Tax	0.3530	0.4000	0.3904	0.0001	0.0149	0.0000	-1.3110	0.0210	0.2880	0.0430
Lev	0.0000	0.9120	0.1378	0.0013	0.1473	0.0220	1.1390	0.0210	0.9420	0.0430
Size	-2.7445	5.4088	2.4279	0.0081	0.9307	0.8660	0.0310	0.0210	0.2580	0.0430
Oscore	0.0000	1.0000	0.5465	0.0028	0.3215	0.1030	-0.3460	0.0210	-1.2970	0.0430
MB	0.0147	221.9101	3.3253	0.0599	6.8949	47.5400	14.3440	0.0210	310.8130	0.0430
Valid N (lis	13258									

5.quintile Descriptive Statistics

	Minimum	Maximum	Mean		Std. Deviat	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
OpLeas	0.0000	0.9476	0.0078	0.0004	0.0467	0.0020	10.7380	0.0210	143.7040	0.0430
FiLeas	0.0000	0.1871	0.0005	0.0000	0.0054	0.0000	18.4740	0.0210	449.7590	0.0430
OpLeNum	0.0000	1.0000	0.1693	0.0033	0.3750	0.1410	1.7640	0.0210	1.1120	0.0430
FiLeNum	0.0000	1.0000	0.0370	0.0016	0.1888	0.0360	4.9040	0.0210	22.0550	0.0430
Tax	0.4000	0.4800	0.4300	0.0002	0.0222	0.0000	1.6160	0.0210	1.0460	0.0430
Lev	0.0000	0.7989	0.1002	0.0010	0.1132	0.0130	1.4990	0.0210	2.6120	0.0430
Size	-0.4384	5.2207	2.4906	0.0060	0.6955	0.4840	0.3810	0.0210	0.7640	0.0430
Oscore	0.0000	1.0000	0.6426	0.0026	0.2999	0.0900	-0.6830	0.0210	-0.8640	0.0430
MB	0.0391	126.0917	1.7785	0.0251	2.8952	8.3820	13.8160	0.0210	411.4770	0.0430
Valid N (lis	13261									

APPENDIX 4, statutory tax rates:

STATUTORY FEDERAL TAX	2003	2002	2001	2000	1999
AUS	0.3	0.3	0.34	0.36	0.36
AUT	0.34	0.34	34	0.34	0.34
BMU	0	0	0	0	0
CAN	0.366	0.386	0.421	0.446	0.446
CMY	0	0	0	0	0
CHN	0.33	0.33	0.33	0.33	0.33
DNK	0.3	0.3	0.3	0.32	0.32
FIN	0.29	0.29	0.29	0.29	0.28
FRA	0.3533	0.343	0.353	0.36666	0.4
DEU	0.3958	0.3836	0.3836	0.428	0.436
HKG	0.175	0.16	0.16	0.16	0.16
IND	0.3675	0.357	0.3955	0.385	0.35
IRL	0.125	0.16	0.2	0.24	0.28
ITA	0.3825	0.4025	0.4025	0.4125	0.4125
JPN	0.42	0.42	0.42	0.42	0.48
MYS	0.28	0.28	0.28	0.28	0.28
NLD	0.345	0.345	0.35	0.35	0.35
NZL	0.33	0.33	0.33	0.33	0.33
SGP	0.22	0.245	0.247	0.26	0.26
ZAF	0.378	0.378	0.378	0.378	0.378
SWE	0.28	0.28	0.28	0.28	0.28
CHE	0.241	0.245	0.247	0.251	0.251
THA	0.3	0.3	0.3	0.3	0.3
GBR	0.3	0.3	0.3	0.3	0.31
USA	0.4	0.4	0.4	0.4	0.4
TWN	0.25	0.25	0.25	0.25	0.25

APPENDIX 5, descriptive statistics for size dependence (table 19):

Descriptive Statistics the smallest 20 percent

	Range	Minimum	Maximum	Sum	Mean		Std. Deviat	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
OpLeas	1.0000	0.0000	1.0000	294.0000	0.0200	0.0010	0.0700	0.0050	5.9510	0.0210	48.5700	0.0430
FiLeas	1.0000	0.0000	1.0000	83.0000	0.0100	0.0000	0.0270	0.0010	9.3020	0.0210	115.4820	0.0430
OpLeNum	1.0000	0.0000	1.0000	4156.0000	0.3100	0.0040	0.4640	0.2150	0.8030	0.0210	-1.3550	0.0430
FiLeNum	1.0000	0.0000	1.0000	4079.0000	0.3100	0.0040	0.4620	0.2130	0.8320	0.0210	-1.3080	0.0430
Tax	0.0000	0.0000	0.0000	1582.0000	0.1200	0.0010	0.1650	0.0270	0.7590	0.0210	-1.2410	0.0430
Lev	0.9829	0.0000	0.9829	899.0333	0.0679	0.0011	0.1260	0.0160	2.5360	0.0210	7.1910	0.0430
Size	5.4605	-4.0915	1.3690	9566.1790	0.7221	0.0057	0.6581	0.4330	-1.9180	0.0210	4.7120	0.0430
Oscore	1.0000	0.0000	1.0000	9637.8815	0.7276	0.0029	0.3351	0.1120	-1.0310	0.0210	-0.4270	0.0430
MB	298.6739	0.0026	298.6765	98686.3961	7.4497	0.1689	19.4361	377.7610	8.1640	0.0210	84.4150	0.0430
Valid N	13247											

Descriptive Statistics for the largest 20 percent

	Range	Minimum	Maximum	Sum	Mean		Std. Deviat	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
OpLeas	0.9991	0.0000	0.9991	702.0643	0.0530	0.0011	0.1291	0.0170	4.3240	0.0210	21.2040	0.0430
FiLeas	0.5021	0.0000	0.5021	57.9716	0.0044	0.0002	0.0229	0.0010	11.3270	0.0210	160.4140	0.0430
OpLeNum	1.0000	0.0000	1.0000	8029.0000	0.6100	0.0040	0.4890	0.2390	-0.4320	0.0210	-1.8130	0.0430
FiLeNum	1.0000	0.0000	1.0000	3652.0000	0.2800	0.0040	0.4470	0.2000	1.0050	0.0210	-0.9890	0.0430
Tax	0.5000	0.0000	0.5000	4055.5000	0.3060	0.0014	0.1575	0.0250	-1.1600	0.0210	-0.2060	0.0430
Lev	0.9120	0.0000	0.9120	2282.6748	0.1722	0.0012	0.1387	0.0190	0.8870	0.0210	0.8180	0.0430
Size	2.5617	2.8471	5.4088	45273.2102	3.4148	0.0041	0.4732	0.2240	1.1460	0.0210	1.0050	0.0430
Oscore	1.0000	0.0000	1.0000	9233.5091	0.6964	0.0023	0.2627	0.0690	-0.9910	0.0210	-0.0210	0.0430
MB	189.5101	0.0100	189.5201	36591.0502	2.7599	0.0426	4.9087	24.0950	15.7980	0.0210	419.4840	0.0430
Valid N	13247											